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CHANGING FOR THE BETTER

We start 2024 with determination, renewed energy and changing for the better. Our Revista Goiana de Medicina, official publication of the Medical Association of Goiás (AMG), Faculty of Medicine of the Federal University of Goiás (FM/UFG) and Academia Goiana de Medicina (AGM), has undergone restructuring and will adopt, from the next edition, the continuous flow system, providing a more dynamic and accessible approach to readers and researchers. The magazine will continue to publish three volumes annually, following a four-monthly closing schedule.

With this, we hope to serve our readership even more efficiently, contributing decisively to the dissemination of relevant and unpublished scientific works, reaching new heights and exceeding expectations with each edition.

Don't miss the opportunity to be part of these pages that value medical activity in Goiás.

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SCIENTIFIC ARTICLE - ORIGINAL ARTICLE

MATERNAL MORTALITY DUE TO COVID-19 IN A REFERENCE UNIT IN GOIÂNIA - GO

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ABSTRACT

INTRODUCTION: The SARS-CoV-2 coronavirus has been impacting society since late 2019 and Brazil since early 2020, causing a global pandemic. Physiological changes during pregnancy can increase the severity of respiratory infections in these patients, leading to an increased risk of obstetric complications and mortality. Therefore, pregnant women and postpartum women are now considered at risk, requiring proper prevention and management.

OBJECTIVES: To evaluate maternal deaths due to COVID-19 at a reference unit in Goiânia - GO and to outline a profile of these patients.

METHODOLOGY: Observational, descriptive, and cross-sectional study conducted at the Hospital and Maternity Municipal Célia Câmara between November 2020 and December 2021, analyzing data from pregnant women hospitalized for COVID-19 who died.

RESULTS: Twenty-five maternal deaths due to COVID-19 were identified, out of a total of 908 hospitalized patients and 481 live births in the unit. The maternal mortality rate was 5.2 deaths per 100 live births. Half of the women were from Goiânia and the other half from cities in the interior of Goiás. Deaths in women aged 20 to 29 years accounted for 44% of the total, as did deaths in women aged 30 to 39 years, and 12% occurred in women aged 40 to 49 years. Of the deaths, 72% occurred in pregnant women in the third trimester, 16% in the second trimester, 4% in the first trimester, and 8% in the postpartum period. Comorbidities were identified in 80% of the patients, with 68% overweight or obese and 28% having hypertensive disease. Of the deliveries, 80% were cesarean sections and 8% were induced vaginal deliveries, with 8% maternal death with intrauterine fetal demise and 4% spontaneous abortion. Live births accounted for 79% of the outcomes of embryos or fetuses, 17% evolved with intrauterine fetal death, and 4% spontaneous abortion. Obstetric complications were reported in 48% of patients (oligohydramnios/fetal distress, bleeding/placenta previa, wound dehiscence, and amniorrhexis).

CONCLUSION: The maternal mortality rate from COVID-19 at the Hospital and Maternity Municipal Célia Câmara was alarming when compared to pre-pandemic deaths in Goiás. The highest prevalence of maternal deaths occurred among women aged 20 to 39, with comorbidities such as overweight/obesity and hypertensive disease, in the third trimester of pregnancy. The majority underwent cesarean delivery, with live-born infants, and obstetric complications occurred in about half of the cases.

Keywords: COVID-19; Pregnant Women; Maternal Mortality; SARS-CoV-2.

INTRODUCTION

The new coronavirus, named SARS-CoV-2, has been plaguing the world since late 2019 and Brazil since early 2020. During this period, healthcare systems have experienced a different dynamic from

usual, with acute respiratory syndromes overwhelming Health Units and leading thousands of patients to death, directly or indirectly. Until the twenty-ninth epidemiological week of 2023, data from the Coronavirus Panel indicate about 37 million confirmed cases and 704,000 deaths from SARS-CoV-2, demonstrating the impact of the disease.[1]

With the progression of the pandemic and the conduct of new studies, the proportion of women affected during pregnancy and the postpartum period increased. More publications have been made correlating SARS-CoV-2 infection with obstetric complications. Brazilian studies have shown a high number of maternal deaths, associated with both comorbidities and serious failures in healthcare. Therefore, pregnant and postpartum women have come to be seen as a high-risk group for severe disease.[2]

Pregnancy is associated with physiological changes in the female body, including cardiovascular, immune, and respiratory system alterations, which can potentially favor more severe cases of infections, especially respiratory ones. From the analysis of past coronavirus epidemics and studies available in the literature on SARS-CoV-2, it is observed that these viruses cause more severe diseases in the pregnant women population, which presents a higher risk of morbidity and mortality due to SARS-CoV-2 infection compared to the non-pregnant population.[3-5]

The literature indicates that about 94% of Brazilian pregnant and postpartum women diagnosed with Severe Acute Respiratory Syndrome caused by the virus needed to be hospitalized[6]. Additionally, evidence indicates that pregnant women are more likely to be admitted to the ICU, require ventilation, and die compared to non-pregnant women.[7] Epidemiological data from the COVID-19 Observatory Bulletin published in June 2021 placed Brazil as the country with the highest number of maternal deaths from the disease, with a mortality rate among pregnant and postpartum women of 7.2%, about three times higher than the mortality rate from the virus in the Brazilian population during that period, which was 2.8%.[8]

In light of these increased risks, vaccination of pregnant women against COVID-19 is a strong recommendation, supported by a wide range of data confirming its safety and efficacy. The literature does not show higher risks of negative obstetric outcomes due to vaccination. Furthermore, the non-detection of IgM in the umbilical cord or spike protein or mRNA of SARS-CoV-2 in the placenta or umbilical cord after vaccination of the pregnant woman suggests that there is no stimulation of the immune response in the fetus, indicating that the vaccine does not cross the placental barrier.[9]

A retrospective cohort study involving 472 pregnant women showed that vaccinated patients did not progress to severe disease, compared to 7.2% of unvaccinated pregnant women who developed more severe cases, and had a lower likelihood of hospitalization.10 Therefore, the role of vaccination in preventing more severe cases of the disease and improving clinical outcomes in pregnancy is already well established in the scientific literature, and it is the role of the physician to encourage this practice.[11]

OBJECTIVES

1. General objective

To evaluate maternal deaths due to COVID-19 at the reference unit Hospital e Maternidade Municipal Célia Câmara in Goiânia - GO.

2. Specific objectives
2.1. Calculate the maternal mortality rate due to COVID-19 at the hospital.
2.2. Identify the place of residence and age of the deceased pregnant women.
2.3. Identify the gestational age and comorbidities of the deceased pregnant women.
2.4. Identify the obstetric complications and outcomes of the cases studied.

METHODOLOGY

This is an observational, cross-sectional, retrospective, and descriptive study based on the data collected from the medical records of pregnant women admitted to the Hospital and Maternity Célia Câmara Municipal between November 2020 and December 2021.

1. Procedimentos

The medical records of pregnant patients who died from COVID-19 at the Hospital and Maternity Municipal Célia Câmara between November 2020 and December 2021 were fully analyzed. Access to the records was done through the Tasy system after approval from the Municipal School of Public Health (EMSP), according to protocol 07/2022.

2. Study population

The sample of the present study consisted of 25 medical records. The collected data were stored in Microsoft Excel.

3. Inclusion criteria

Women admitted to Hospital e Maternidade Municipal Célia Câmara between November 2020 and December 2021, with confirmed COVID-19 by laboratory test during any period of pregnancy and immediate postpartum, who died, were included in the study. Pregnant women with a positive test but whose outcome was not death, as well as those with causes of death not related to SARS-CoV-2, were excluded.

4. Study variables
4.1. Maternal age
4.2. Place of residence
4.3. Comorbidities
4.4. Gestational age
4.5. Obstetric complications
4.6. Obstetric outcome
4.7. Type of delivery
4.8. Outcome of the embryo/fetus

5. Approval by the Ethics Committee

This study was approved by the Research Ethics Committee of the Hospital das Clínicas of the Federal University of Goiás, under protocol number 5,538,191.

RESULTS

During the analyzed period, 25 pregnant or postpartum patients died from COVID-19, out of a total of 908 pregnant women who were hospitalized during this period. The total number of maternal deaths between 2020 and 2021, regardless of cause, was 27 women. In total, 502 births were performed, resulting in 481 live births in the unit. The maternal mortality rate from this disease was 5.2% (5.2 deaths per hundred live births).

Twelve women were from the municipality of Goiânia. Each of the other patients was from one of the following municipalities, with no repetitions: Indiara, Trindade, Araguapaz, Niquelândia, Iporá, Alexânia, Rio Verde, Caldas Novas, Orizona, Quirinópolis, Uruaçu, and Itajá. The municipality of origin was not reported for one of the patients in the medical records.

It was observed that 44% of maternal deaths occurred in the age group of 20 to 29 years (11/25), 44% were in women aged 30 to 39 years (11/25), and 12% of these deaths occurred in the 40 to 49 years age group (3/25).

Regarding gestational age, it was observed that 72% of maternal deaths occurred in those infected in the third trimester of pregnancy (18/25), 16% in the second trimester (4/25), and 4% in the first trimester (1/25). Women in the postpartum period accounted for 8% of deaths (2/25).

Among these women, 20% did not have any comorbidity (5/25). 68% of the patients were overweight or obese (17/25), which represents 59% of the comorbidities found (17/29). Hypertensive disease was associated with 28% of maternal deaths from COVID-19 (7/25), representing 24% of the comorbidities (7/29). Two patients had hypothyroidism, one had gestational diabetes mellitus, one had Chagas disease, and one had a history of Hodgkin's lymphoma, totaling 29 comorbidities identified.

Twenty-two deliveries were performed among the pregnant women who died from COVID-19. Regarding the type of delivery in this group of patients, 20 cesarean sections were performed, accounting for 80% of the obstetric outcomes (20/25). Two vaginal deliveries were induced by the medical team due to fetal death, resulting in the birth of a non-viable fetus, corresponding to 8% of the cases (2/25). Additionally, 8% of the patients had maternal death with an intrauterine fetus (2/25), and 4% had a spontaneous abortion (1/25).

Regarding the outcomes of the embryos or fetuses, 79% of them were born alive (19/24), with one death in the delivery room among the newborns; 17% had intrauterine fetal death (4/24), two of which were due to maternal death; and 4% were spontaneous abortions (1/24). The status of one of the fetuses could not be identified because the patient was already admitted to the hospital in the immediate postpartum period.

Obstetric complications were not reported in 44% of women (11/25). Fifteen complications were identified among the 14 patients who presented them. Among the complications, it was observed that 36% of women had oligohydramnios and/or fetal distress (9/25), which corresponds to 60% of the observed complications; 12% had vaginal bleeding and/or placenta previa (3/25), 20% of the total complications; 8% had wound dehiscence (2/25), responsible for 13% of the complications; and 4% of women had amniorrhexis (1/25), quantifying 7% of the complications.

DISCUSSION

The maternal mortality rate from COVID-19 found in this study was 5.2 deaths per hundred live births (5.2%), with a total of 25 maternal deaths. When calculating the overall maternal mortality rate

in the state of Goiás in 2019, based on data obtained from DATASUS, there were 67 deaths, which corresponds to a rate of 0.07%.12 Even with data referring to a single cause of maternal death in a single health unit in the state, the mortality rate found in this study was quite high compared to the pre-pandemic period. This justifies the need to assess the impact of SARS-CoV-2 infection on maternal mortality.

In a cohort study that included 18,715 infected pregnant women, Chinn described that these women had an increased mortality rate of 0.13% compared to pregnant women without the disease, with a peripartum mortality rate of 0.1%.

Half of the women were from the municipality of Goiânia. There is a diversity in the other places of origin of the patients, demonstrating that the Hospital and Maternity Célia Câmara is a reference unit in obstetric management. Leung, Simões e Silva and Oliveira[14] observed that, in Brazil, women with more advanced gestational age were more likely to be referred for hospitalization in health units with greater structure, usually in metropolitan areas, and with the presence of an obstetric center.

There was a prevalence of maternal deaths in the age group of 20 to 29 years, representing 44%, and in the age group of 30 to 39 years, also representing 44%. In the literature, Smith[15] associated older maternal age, from 35 to 40 years, with a higher risk of intensive care treatment, ICU admissions, ventilation, pneumonia diagnosis, premature placental abruption, and cesarean delivery.

Maternal deaths in pregnant women occurred in 72% of cases in the third trimester. Januszewski[16] reported that the majority of pregnant patients infected with SARS-CoV-2 require hospital medical care if infected in the third trimester. Stock[17] found that 33.5% of pregnant women in the third trimester required hospitalization and 4.3% required intensive care unit care, compared to 6.7% hospitalizations in the first trimester and 10.7% in the second trimester.

The immunological changes that occur in the third trimester, characterized by a pro-inflammatory state that prepares the maternal body for delivery, make pregnant women more susceptible to severe systemic inflammatory manifestations in a disease characterized by a "cytokine storm," such as COVID-19. This maternal inflammatory response is also associated with the need for improved oxygenation, contributing to a higher incidence of preterm births in infected patients.[18]

However, the cohort study by Leung, Simões e Silva and Oliveira[14], based on data from 7,461 Brazilian pregnant women, described similar risks of mortality and morbidity among hospitalized pregnant women with COVID-19 at different gestational ages, with no greater risk perceived in the third trimester.

Comorbidities were present in 80% of the patients, with overweight or obesity and hypertensive disorders being the most common among pregnant women who died in this study. These conditions, along with diabetes, were also identified by Takemoto[19] as the most associated with maternal mortality in Brazil at the beginning of the pandemic. As with other populations, the presence of comorbidities associated with SARS-CoV-2 infection is a risk factor for severe outcomes in pregnant women.

The meta-analysis by Smith[15] included 21,977 cases of this disease in pregnancy or the postpartum period. It found a 3.8 times higher risk of maternal mortality for pregnant women with pre-existing diabetes mellitus, 2.75 times higher for those with chronic hypertension, and 16.8 times higher for those with cardiovascular diseases, compared to pregnant women without these chronic diseases. An increased risk of maternal morbidities was also observed, including hypertensive disorders of pregnancy, preterm birth, and cesarean delivery.

Regarding weight, pregnant women with obesity showed an increased risk for severe disease, with a body mass index (BMI) greater than or equal to 30 being a determinant for increased risk of ICU admission, ventilation, and pneumonia, but it was not related to maternal mortality in the study by Smith[15]. On the other hand, Mihajlovic[20] described that obese pregnant patients infected with SARS-CoV-2 showed a higher frequency of complications and lethality, since, when associated with physiological changes of pregnancy, it can lead to a more pronounced reduction in respiratory function.

When evaluating maternal deaths from COVID-19 in Latin America, Maza-Arnedo[21] identified obesity in 49.4% of these patients, chronic hypertension in 8.4%, and preeclampsia in 7.4% of deaths. In the present study, the rates were higher, with 68% of women having BMI alterations, characterized as overweight or obese, and 38% having hypertensive disorders.

The main obstetric outcome found in this study was cesarean section, evidenced in 80% of cases that resulted in death in the analyzed health unit. In agreement with this finding, Marchand[22] described that in the analysis of 42,754 pregnant women hospitalized with COVID-19, 53.2% of them underwent cesarean section. Metz[5] also identified a higher risk of cesarean section in patients with severe disease.

It is suggested that these higher rates of cesarean section are related to emergency indications due to maternal health conditions in the context of severe SARS-CoV-2 infection, such as worsening respiratory status, in an attempt to improve cardiopulmonary function. Additionally, obstetric indications for this mode of delivery, such as fetal distress, were also reported, aiming to prevent fetal mortality.[5,22,23]

The vaginal deliveries observed in this study were associated with intrauterine fetal death, both being induced by the medical team. This corresponded to 8% of the obstetric outcomes, a value lower than that reported by Maza-Arnedo[21], who reported a rate of 15.6% of vaginal deliveries in pregnant women who died from COVID-19 in Latin America.

The fetal prognosis was favorable in this study, with the majority of fetuses being born alive (79%). However, intrauterine deaths were observed in 17% of cases, and spontaneous abortion occurred in 4%. Maza-Arnedo[21] highlighted stillbirth as a perinatal complication arising from maternal infection with SARS-CoV-2. Similarly, Boettcher and Metz[24], in a literature review, reported a higher likelihood of stillbirth in pregnant women with the condition, especially during the period of the Delta variant. It is suggested that fetal and neonatal deaths in the context of this viral infection may result from direct fetal infection through vertical transmission, severe maternal disease, preterm labor in intrauterine infection, and placental insufficiency secondary to placental damage, highlighting the complexity of the maternal-fetal relationship.

Wei[25] conducted a systematic review in which the finding of vascular malperfusion in the placenta on histological analysis of women infected with SARS-CoV-2 at the time of delivery was described, suggesting that this factor would contribute to fetal deaths and preterm births. Regarding vertical transmission, the literature reinforces that it is a rare mechanism of transmission, occurring in a minority of cases during the third trimester, although it is associated with other congenital infections. In the absence of scientific evidence, it cannot be characterized as the transfer of SARS-CoV-2 from the mother to the fetus through vaginal secretions, amniotic fluid, breast milk, or umbilical cord and placental blood.[26-30]

Obstretic complications were present in 52% of the pregnant women in this study, with oligohydramnios being a significant factor contributing to complications and fetal distress. Medeiros[26] evidenced that symptomatic pregnant women with SARS-CoV-2 infection are more likely to have adverse fetal outcomes, with histopathological findings of poor vascular and fetal perfusion, which is a contributing factor to obstetric complications. Additionally, Giuliani[31] infer that pregnant women with COVID-19 present more pregnancy-related complications, such as fetal distress, than women without this diagnosis.

Medeiros[26] also mention the prevalence of oligohydramnios (11/358), amniorrhexis (5/359), and non-reassuring fetal status (62/363) in an observational study in Latin America, suggesting that they were more present in women who had fever and shortness of breath during the viral infection process, as well as Singh[32] observed a significant increase in severe oligohydramnios in the second wave of the disease.

CONCLUSION

The present study identified a maternal mortality rate due to COVID-19 of 5.2% (5.2 deaths per hundred live births). Half of the patients were from Goiânia, and the other half came from other municipalities in the interior of the state of Goiás. Among the deaths, 44% occurred in women aged 20 to 29, 44% in women aged 30 to 39, and 12% in women aged 40 to 49. Regarding gestational age, 72% of the deaths occurred in women in the third trimester, 16% in the second trimester, 4% in the first trimester, and 8% in the immediate postpartum period. The majority of women had comorbidities (80%); 68% were overweight or obese, and 28% had hypertensive disease. Of the deliveries, 80% were cesarean sections, 8% were induced vaginal deliveries, 8% were maternal deaths with intrauterine fetal death, and 4% were spontaneous abortions. As a neonatal outcome, 79% of the embryos or fetuses were born alive, 17% had intrauterine fetal death, and 4% were spontaneous abortions. Obstetric complications were reported in 56% of patients, including oligohydramnios, fetal distress, vaginal bleeding, placenta previa, surgical wound dehiscence, and amniorrhexis.

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SCIENTIFIC ARTICLE - ORIGINAL ARTICLE

POSTPARTUM HEMORRHAGE AT THE MATERNITY UNIT OF THE HOSPITAL DAS CLÍNICAS DE GOIÂNIA

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ABSTRACT

INTRODUCTION: Postpartum hemorrhage (PPH) is a serious complication that can occur after childbirth and is characterized by excessive blood loss. It is, in fact, the leading cause of maternal mortality worldwide. Studies show that the prevalence of postpartum hemorrhage worldwide is approximately 10%, ranging from 2 to 16%, with uterine atony being the main etiology.

OBJECTIVES: To calculate the prevalence rate of PPH, identify the types of delivery of the patients, identify the causes, and identify maternal and fetal outcomes.

METHODOLOGY: This is a cross-sectional, retrospective, analytical, and descriptive study that evaluated the medical records of women who had hemorrhage at the Hospital das Clínicas from Universidade Federal de Goiás (HC-UFG) in 2021.

RESULTS AND DISCUSSION: The mean age was 26.11 years, and the mean number of previous pregnancies of these patients was 1.55, both of which were consistent with the literature. We found 9 cases of postpartum hemorrhage among the 532 patients, resulting in a prevalence of 1.69%. Uterine laceration was the main cause of PPH, which was different from the global literature.

CONCLUSION: Our study found a prevalence of 1.69%. Five cases (55.55%) were normal deliveries, and 4 (44.44%) were cesarean sections. Five cases (55.55%) were due to vaginal laceration, 2 cases (22.22%) were due to placenta previa, one case (11.11%) was due to uterine atony and previous anticoagulation, and one case (11.11%) was due to an undefined cause. All patients with PPH survived. One newborn died, and the others were discharged from the hospital.

Keywords: Postpartum Hemorrhage; Prevalence; Hemorrhage; Delivery; Labor Complications.

INTRODUCTION

The number of emergencies during pregnancy has been increasing year after year, especially due to the sociodemographic environment in which women are placed. This issue is reflected in the still high rates of maternal mortality, resulting from complications during pregnancy.[1]

Among the various complications of emergencies during pregnancy and the postpartum period, hemorrhagic emergencies stand out. With regard to this type of emergency, postpartum hemorrhage was traditionally defined as a blood loss exceeding 500mL after vaginal delivery or more than 1000 mL after cesarean delivery. More recently, postpartum hemorrhage has been defined as a cumulative blood loss of 1000mL or more, or loss associated with signs or symptoms of hypovolemia, regardless of the mode of delivery. The typical clinical signs and symptoms of hypovolemia (e.g., hypotension and

tachycardia) due to postpartum hemorrhage may not appear until blood loss exceeds 25% of total blood volume (>1500 mL during late pregnancy).[2]

Postpartum hemorrhage can be primary, occurring within the first 24 hours after delivery, or secondary, occurring between 24 hours and up to 12 weeks after delivery. Completing the definition, the causes of postpartum hemorrhage can be summarized by the four "Ts": tone (uterine atony), trauma (lacerations or uterine rupture), tissue (retained placenta or clots), and thrombin (coagulation factor deficiency).[2]

Postpartum hemorrhages are not entirely preventable; however, identifying their cause must be immediate (an emergency), as knowing the cause of PPH directly impacts the form of treatment and its effectiveness.[3]

Regarding its epidemiology, PPH is observed in about 1 to 3% of births. In the global context, the maternal mortality rate in developed regions such as the United States and Canada was 12 per 100,000 live births in 2015, while in developing regions, it was 239 per 100,000.[4]

The literature found that 99% of maternal deaths occurred in developing countries, with more than half of them occurring in crisis contexts, inadequate environments, and resource-poor settings. In the national context, the maternal mortality ratio increased from 62 to 64 per 100,000 live births between 2015 and 2017, varying according to the region.[4]

OBJECTIVES

1. General Objective

To evaluate the prevalence rate of postpartum hemorrhage in women who gave birth at the maternity ward of HC-UFG in the year 2021.

2. Specific objectives

2.1. Calculate the prevalence rate.
2.2. Identify the type of delivery of patients with postpartum hemorrhage.
2.3. Identify the causes of postpartum hemorrhage.
2.4. Identify the maternal and fetal outcomes of the studied cases.

METHODOLOGY

This is a cross-sectional, retrospective, analytical, and descriptive study through data collection from the medical records of women at the maternity ward of the Hospital das Clínicas in Goiânia. The sample for this study consisted of women who gave birth at the maternity ward of the Hospital das Clínicas in Goiânia, from January to December 2021.

1. Procedures

Medical records of patients who gave birth at the maternity ward of the Hospital das Clínicas in Goiânia in 2021 were analyzed. The records analyzed included perioperative assessment, delivery description, hospitalization progress notes, medical prescriptions during hospitalization, and maternal and neonatal discharge reports (when available). Access to the medical records was obtained through the SAMIS (Medical and Health Information Service) of the HC-UFG after approval by the Research Ethics Committee (CEP).

2. Study population

The sample for this study consisted of 532 medical records. The collected data were stored in Google Sheets.

3. Inclusion criteria

The study included medical records of patients who gave birth at the maternity ward of the Hospital das Clínicas in Goiânia in the year 2021.

Exclusion criteria: medical records that were not found in the SAMIS, records that did not contain information about the delivery/hospitalization, and records of patients whose delivery occurred outside the maternity ward of the Hospital das Clínicas in Goiânia in the year 2021 were excluded from the study.

4. Study variables

4.1. Variables for the entire sample

A. Type of delivery (vaginal or cesarean).
B. Postpartum hemorrhage: present or absent.

4.2. Variables for the sample with PPH

A. Type of delivery (vaginal or cesarean).
B. Maternal age (years).
C. Obstetric history: GPNCA - Gravida (number of pregnancies), Para (number of viable pregnancies), Normal (number of normal deliveries), Cesarean (number of cesarean deliveries), and Abortions (number of abortions).
D. Description of previous pregnancies: complications during pregnancy and/or delivery.
E. Previous diagnoses: morbidities and comorbidities.
F. Medications used prior to admission.
G. Date of delivery (dd/mm/yyyy).
H. Description of delivery: complications during the procedure.
I. Treatment: intraoperative procedures and/or management during hospitalization.
J. Maternal outcome: hospital discharge (with date) or death.
K. Newborn outcome: alive, death, and/or hospital discharge.

5. Approval by the Ethics Committee

This study was approved by the Research Ethics Committee of the Hospital das Clínicas of the Federal University of Goiás, with protocol number 5951.648.

RESULTS

We analyzed 532 medical records of women who gave birth at the maternity ward of the Hospital das Clínicas of the Federal University of Goiás in 2021, which represents our total sample size of 100%. We found 392 cesarean deliveries, accounting for 73.68% of the total, and 140 vaginal deliveries, representing 26.31% of the total.

Among these 532 analyzed deliveries, 9 resulted in Postpartum Hemorrhage (PPH), giving us a prevalence of 1.69%. Detailing each of these 9 cases of PPH, we have: 5 of these cases were from vaginal delivery and 4 from cesarean section. The ratio of "number of cases of postpartum hemorrhage via vaginal

delivery" to "total number of vaginal deliveries" was 3.57%. The ratio of "number of cases of postpartum hemorrhage via cesarean section" to "total number of cesarean deliveries" was 1.02%.

The average age of the women was 26.11 (18, 22, 23, 27, 28, 28, 29, 29, 31) years. The median was 28 years. The mode was 28 and 29 (bimodal).

The average number of pregnancies for the patients, considering the current pregnancy, was 2.55 (1, 1, 2, 2, 2, 3, 3, 4, 5) pregnancies. The average number of previous pregnancies for these patients was 1.55 (0, 0, 1, 1, 1, 2, 2, 3, 4) pregnancies.

In relation to the etiologies of the hemorrhages, we have the following breakdown: of the 9 cases, 5 were due to laceration (55.55%), 2 were due to placenta previa (22.22%), 1 was due to uterine atony and previous anticoagulation (11.11%), and 1 was of undefined cause (11.11%).

All cases of PPH reported in this study had immediate bleeding. The 9 patients survived and were discharged from the hospital.

Of the patients with PPH evaluated, the first patient was 29 years old, with a history of 2 previous pregnancies, both by normal delivery, without complications. The same patient had preeclampsia, was using antihypertensive medication, but still had blood pressure control issues, and hypothyroidism. Regarding prior medication use, the patient was taking ferrous sulfate 40 mg and levothyroxine 25 mcg. The patient's delivery occurred on April 10, 2021, at 6:00 a.m. The description of the delivery indicates that it occurred spontaneously (normal). During the intraoperative period, a second-degree mediolateral laceration to the right was found. Subsequently, the patient had increased, unmeasured bleeding, and suturing was performed with simple Catgut thread, along with one ampoule of oxytocin and one ampoule of Methergine. The bleeding then reduced, the patient was cleaned, and the surgical procedure was concluded. Two and a half hours after delivery, the patient received an additional 1000 ml of 0.9% saline solution intravenously (IV). During the course of hospitalization, the patient did not present new bleeding or other complaints and complications. The patient was discharged on April 12, 2021, along with the newborn.

The second patient was 31 years old, with a history of 4 pregnancies, with no information about the delivery methods or complications in these previous pregnancies. This patient had Chagas disease, gestational diabetes mellitus (GDM), and deep vein thrombosis (DVT) in the left lower limb as pre-existing conditions. The patient was on full anticoagulation with Marevan, with no further information about other possible medications used before. The patient's delivery occurred on January 7, 2021, after being admitted to the emergency room of the Hospital das Clínicas with DVT on full anticoagulation, progressing to an urgent cesarean section due to acute fetal distress. In the description of the patient's delivery, it was noted that it was performed by cesarean section, showing uterine atony and intense vaginal bleeding. During the intraoperative period, a hysterorrhaphy was performed with chromic Catgut 0 thread via abdominal route, after uterine atony was not reversed with massage, oxytocin, and Methergine. During the hysterorrhaphy, ligation of the uterine arteries was performed, a sub-aponeurotic drain was placed, a compressive dressing was applied, and the surgical procedure was concluded. In the immediate postoperative period, the patient received 500 ml of fresh plasma by transfusion. On January 8, the patient received a blood transfusion with 2 units of packed red blood cells (PRBC) and an additional 500 ml of fresh plasma. During the course of hospitalization, the patient did not present new complaints or complications. The patient was discharged on January 13, 2021, and the newborn died due to multiple malformations.

The third patient was 28 years old, with a history of 2 pregnancies. Her first pregnancy was uneventful, while her second pregnancy resulted in a stillborn at 29 weeks due to malformation. The patient had a previous diagnosis of anemia and gestational diabetes mellitus (GDM), and her previous medications included Ferrous sulfate 40 mg, 1 capsule per day. The delivery occurred vaginally on November 27, 2021, starting at 8:30 in the morning. Complete placental detachment and velamentous cord insertion were observed. Additionally, there was a laceration in the posterior cervix with slightly increased bleeding and a second-degree laceration in the perineum. Treatment included intramuscular oxytocin 10 IU, compression of the laceration to stop bleeding, and no suturing of the posterior cervical laceration. Suturing with Catgut 0 was performed for the second-degree perineal laceration. The patient received normal saline 0.9% IV + oxytocin 5 IU and Ibuprofen 600 mg. She was discharged on November 29, 2021, along with the newborn.

The fourth patient was 22 years old, with no previous pregnancies. Her previous diagnoses were preeclampsia, gestational diabetes mellitus (GDM), and preeclampsia. Her previous medications included methyldopa, lamotrigine, and fluoxetine. The delivery occurred vaginally on November 27, 2021, starting at 11:00 in the morning. Placental detachment was observed, which progressed to abundant postpartum hemorrhage. Bimanual uterine compression was performed, and 10 IU of oxytocin IM was administered. Volume replacement was done with 500ml of normal saline (NS) with 4 ampoules of oxytocin. Eight ampoules of tranexamic acid and misoprostol 800mcg rectally were administered, and O- blood was requested. A Pinard safety ball was also formed. Upon revision, a first-degree laceration in the labia minora was found and sutured with Chromic Catgut 3-0, along with a first-degree laceration in the perineum, which was sutured with Catgut 3-0. On the same day, dexamethasone 4mg IM and tramadol 100mg IV were administered. The patient also used ferrous sulfate 40mg orally (PO) and applied cold compress to the perineum twice a day the next day. She was discharged on November 29, 2021, along with the newborn.

The fifth patient was 28 years old, with a history of 3 previous pregnancies and a history of increased bleeding after a normal delivery 8 years ago. Her only previous diagnosis was fetal hemolytic anemia due to Rh factor incompatibility, and there was no information about her previous medications. The delivery in question was a cesarean section, performed on May 30, 2021, at 4:40 pm. At 6:00 pm, the patient, in the immediate postoperative period, began to bleed, so 500ml of 0.9% saline solution with 2 ampoules of oxytocin EV were administered, followed by another 500ml of 0.9% saline solution. Additionally, she was given Tenoxicam 20mg (1 ampoule) and Methergine (1 ampoule) IM. She also received 250mg of Tranexamic acid and an ice pack in the lower abdominal region. And 1000ml Ringer's lactate. Finally, she was discharged on June 1, 2021, along with the newborn.

The sixth patient was 18 years old, in her first pregnancy. There was no information about previous diagnoses or medications in use. The patient was admitted with spontaneous labor, progressing to a normal delivery at 8:00 p.m. on October 1, 2021. In the description of the delivery, after revision of the birth canal and complete placental detachment, there was abundant bleeding due to a second-degree laceration in the perineum, in the median vagina, and in bilateral medium-lateral areas. Intraoperatively, the laceration was sutured with simple chromic catgut 0 and 10 IU of oxytocin IM. On the same day, Ringer's lactate solution 500ml IV, Ibuprofen 50 mg PO every 8 hours, Dipyrone 500mg PO, Methergine 1 ampule IM every 8 hours, and Dramin B6 1 ampule IV every 8 hours were administered, along with cold compresses three times a day. On the second and third postoperative days, an additional 500ml of 0.9% saline IV

was given each day. In the following days of hospitalization, the patient progressed without complaints or other alterations. The patient was discharged on October 4, 2021, along with the newborn.

The seventh patient was 23 years old, with an obstetric history of one pregnancy and one uncomplicated cesarean delivery. She was diagnosed with Chronic Myeloid Leukemia and was previously treated with Imatinib and Hydroxyurea before discovering the pregnancy. However, these medications were discontinued, and the patient continued using only ferrous sulfate. The patient's delivery occurred at 4:40 a.m. on July 17, 2021, and was a normal delivery that immediately progressed with increased bleeding due to a second-degree laceration in the fúrcula. Intraoperatively, the laceration was sutured with chromic catgut and simple Catgut 0, and 500ml of 0.9% saline and 10 IU of oxytocin IV were administered. On the same day, the patient was also treated with Ibuprofen 600mg, Paracetamol, Misoprostol 25 mcg, 10 IU of Oxytocin, 1 ampule of Methergine, and an additional 500ml of 0.9% saline. On July 19, 2021, the patient required another surgery for revision of the birth canal. Suturing of a laceration in the left small lip, 2 units of packed red blood cells (PRBCs), Hydrocortisone 500mg, Misoprostol 200mcg, 1 ampule of Methergine, and 1 unit of fresh frozen plasma (FFP) were administered. The patient progressed well and was discharged on July 31, 2021, along with her newborn.

The eighth patient was 27 years old, with an obstetric history of one previous pregnancy with an uncomplicated vaginal delivery. Her only prior diagnosis was central total placenta previa, but there was no information about prior medication use. The delivery in question was a cesarean section, starting on October 15, 2021, at 7:40 a.m. She had intense intraoperative bleeding and, on October 16, 2021, her hemoglobin was 6.28. On October 15, 2021, 1 ampule of Methergine was used IM as needed. On October 16, 2021, 2 units of packed red blood cells (PRBCs) and 100mg of hydrocortisone were used IV. Finally, she was discharged on October 19, 2021, along with her newborn.

The ninth patient was 29 years old, with a history of 1 previous pregnancy, a cesarean section without complications. Her previous diagnoses were gestational diabetes mellitus (GDM), complete central placenta previa, placenta accreta, and a cordiform fetus. There is no information about her previous medications. The delivery was a cesarean section, performed on June 17, 2021, without information about the time. Active and intense bleeding was observed at the point of accretion after the removal of the adhered cotyledon. The following methods were performed: clamping, section, and ligation with chromic 01 of the round ligaments, dissection of the anterior leaf of the broad ligament towards the vesicouterine fold of the peritoneum, clamping, section, and ligation of the utero-ovarian and tubal ligaments, dissection of the vesicouterine space, vesical lowering after section of the vesical pillars to the vagina, clamping, section, and ligation of the uterine vessels with chromic 01 at the level of the uterine isthmus, clamping, section, and ligation with chromic 1 of the cardinal and uterosacral ligaments, vaginal circumcision with removal of the surgical piece (uterus), repair of the vaginal angles with Kocher forceps, fixation of the parametria to the vaginal angles with chromic Catgut [1], closure of the vaginal dome with simple Catgut 0, revision of hemostasis of the vesical wall and vaginal dome, and removal of compresses from the abdominal cavity. She was discharged on June 21, 2021, along with her newborn.

DISCUSSION

Calvert[5], in a systematic review, found a global estimated prevalence of PPH to be 10.8%, while that of severe PPH was 2.8%. Regarding severe PPH, Calvert[5] shows that Africa had the highest prevalence (5.1%), followed by North America (4.3%). The estimate is that 3% of women giving birth in South Ameri-

ca, Europe, and Oceania suffer from severe PPH. The lowest prevalence rate of severe forms of this condition is in Asia (1.9%). According to Kebede[6], in an institutional-based cross-sectional study, the overall prevalence of primary PPH was 16.6%, which, however, exceeds the prevalence estimates of other countries such as Japan, India, Uganda, Zimbabwe, and Ethiopia, which presented prevalence rates of 13%, 3.3%, 9%, 1.6%, and 5.8%, respectively. This study found a prevalence of PPH at the maternity ward of the Hospital das Clínicas of the Federal University of Goiás of 1.69% in 2021, a prevalence that was lower than the global literature average.

Oyelese[7], in a systematic review from different regions of the world, showed an overall prevalence of PPH (defined as blood loss greater than 500 mL) of 6.09%. However, when blood loss was objectively measured, the rate nearly doubled, to 10.6%. Calvert[5] also found that studies using subjective measurement methods led to lower prevalence estimates. The prevalence found in our study, 1.69%, does not distinguish between severe and mild cases of PPH, nor is there a diagnostic criterion for blood loss described in the analyzed medical records (whether ≥ 500ml or ≥ 1000ml), or a description of how blood loss was assessed during childbirth, which makes data analysis difficult. However, the prevalence found in our study is more similar to what the literature shows about the prevalence of severe PPH.

When analyzing the relationship between age and PPH, Kebede[6] showed that the mean age of the patients was 27.44 years, with ages ranging from 18 to 40 years, and 83.9% of the patients were aged between 20 and 34 years. In our study, we found a mean age of 26.11 years for the patients, with ages ranging from 18 to 31 years, which is similar to the literature's average.

In relation to the obstetric history of the patients, Kebede[6] showed that 23.7% of patients with PPH were grand multiparas, with 9.7% having had PPH and 7.1% having a history of stillbirth in previous pregnancies. Our study found that the average number of pregnancies for patients with PPH was 2.55 pregnancies, ranging from one to five pregnancies. Regarding complications in previous pregnancies, our work showed that one patient (11.11%) had a history of PPH in a previous pregnancy, one patient (11.11%) had a previous pregnancy with a stillbirth at 29 weeks, and two patients were grand multiparas (22.22%). These complications in previous pregnancies of patients with PPH in the current pregnancy are consistent with the literature, which indicates a higher occurrence of PPH and stillbirth in previous pregnancies of patients who have PPH in the current pregnancy.

Kebede[6] shows that 38.2% of women with PPH had preeclampsia, and 23.5% had antepartum hemorrhage in the current pregnancy. In our study, 2 patients (22.22%) had preeclampsia in the current pregnancy, 4 patients (44.44%) had gestational diabetes mellitus (GDM), one patient (11.11%) had hypothyroidism, one patient (11.11%) had Chagas disease, one patient (11.11%) had deep vein thrombosis (DVT), one patient (11.11%) had hemolytic disease due to Rh incompatibility, one patient (11.11%) had chronic myeloid leukemia, two patients (22.22%) had complete central placenta previa, and one patient (11.11%) had a co-twin fetus. The presence of a wide variety of previous diagnoses in our study, compared to the literature, is due to the fact that the maternity ward of the Hospital das Clínicas of UFG is a tertiary healthcare unit specialized in the care of severe conditions, such as high-risk pregnancies.

With regards to the type of delivery, Kebede[6] shows that normal delivery was present in 81.8% of cases of PPH. Additionally, the literature has shown that the likelihood of PPH increases in patients who have had instrumental vaginal delivery. Our study found that 5 patients (55.55%) had normal delivery and 4 patients (44.45%) had cesarean section, which is in line with the literature, showing a higher occurrence of PPH in normal deliveries, but in a smaller percentage, probably due to our small sample size.

According to Teixeira[8], a quantitative cross-sectional study in a maternity hospital in Salvador, Bahia, Brazil, maternal mortality from PPH in 2015 was 12 cases per 100,000 live births in developed countries, while in developing countries, deaths reach 239 per 100,000 live births. Furthermore, the author states that in the vast majority of developed countries, the mortality rate is less than 1%. In our study, no maternal deaths from PPH were found, which may be related to the service's ability to manage severe cases and the limited sample size.

Regarding the etiology of PPH, Teixeira[8] showed that, of the PPH cases found, 66.32% were attributed to atony, 27.97% were attributed to laceration or trauma, and 3.10% were due to coagulation disorders. Kebede[18] revealed that the most common cause was uterine atony (71.4%), followed by genital trauma (14.3%) and retained placenta (14.3%). The epidemiology of PPH in the United States, according to Bateman[9], showed that uterine atony was present in 79% of PPH cases, and 9.5% had some placental disorder. In our study, we found the etiologies of PPH to be 5 cases due to laceration (55.55%), 2 caused by placenta previa (22.22%), 1 associated with atony and anticoagulation (11.11%), and 1 with no defined cause (11.11%), which differs from what is available in the literature on PPH etiologies, probably due to the limited sample size.

Our study has some limitations, such as a small sample size and the lack of description in the medical records of how the blood loss measurement in PPH was performed, which makes it difficult to compare the data.

We emphasize the need for more studies on the prevalence of PPH in Brazil due to the lack of data in the literature. We recommend that future studies use objective methods to measure blood loss, rather than visual estimation, as the use of non-objective methods can underestimate blood loss due to imprecise measurement, consequently underestimating the prevalence of PPH. It is worthwhile to develop more studies evaluating the impact of early diagnosis and the role of qualified team units on the prevalence of PPH.

CONCLUSION

Our study found 9 cases of PPH among the 532 patients studied, giving us a prevalence of 1.69%. Of the types of delivery, 5 were normal (55.55%) and 4 were cesarean (44.44%). The most common cause (etiology) of PPH was vaginal laceration, accounting for 5 out of the 9 cases (55.55%), followed by placenta previa with 2 cases (22.22%), uterine atony and prior anticoagulation (11.11%), and undefined cause (11.11%). All patients with PPH survived. One newborn died (congenital malformation), while the others were discharged from the hospital.

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SCIENTIFIC ARTICLE - ORIGINAL ARTICLE

CLINICAL-FUNCTIONAL EVALUATION OF PATIENTS WITH ROTATOR CUFF RUPTURES UNDERGOING ARTHROSCOPIC REPAIR WITHOUT ACROMYOPLASTY

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ABSTRACT

Objective: to evaluate clinal and functional results from patients with rotator cuff tear who underwent arthroscopic procedure without acromioplasty.

Methods: Retrospective study with prospective data collection in patients surgically treated with arthroscopic procedure without acromioplasty, in a tertiary orthopedic hospital, due to rotator cuff injuries. The range of motion (ROM) of the operated shoulder was measured. Also, four instruments were utilized for functional evaluation: Western Ontario Rotator Cuff (WORC) Index, Elbow Society (ASES) Shoulder Index, Simple Shoulder Text (SST) e Subjective Shoulder Value (SSV). The Visual Analog Scale (VAS) measured pain in three distinct ments: at rest, during movimentation of the shoulder and during sleep.

Results: Clinical and functional results of 10 patients have been evaluated. The average score observed in VAS was 1.33 at rest, 3.33 at movement and 1.44 during sleep. In the functional evaluation, the average scores were 8.7 in SST, 80 in ASES and 74.44 in SSV. The results in ROM have shown good clinical evolution following the procedure.

Conclusion: Patients with full thickness rotator cuff tears operated through videoarthroscopy without acromioplasty have shown good results in pain, function and range of motion evaluation following the procedure.

Keywords: Arthroscopy; Rotator Cuff Injuries; Rotator Cuff Tear Arthropathy; Shoulder Pain; Shoulder.

INTRODUCTION

Rotator cuff tears and their clinical repercussions, such as shoulder pain, can be treated conservatively or surgically. In conservative therapy, analgesics, hormonal or non-hormonal anti-inflammatories, and functional rehabilitation are used, with satisfactory results possible[1]. However, cases refractory to this treatment receive surgical indication. Generally, a more invasive approach is also considered necessary when a partial tear exceeding 50% of the patient's tendon thickness is observed on magnetic resonance imaging[2].

When choosing the appropriate treatment for each patient, it is necessary to consider the natural course of tendon rupture and data from randomized studies involving patients who received conservative or surgical treatment. There is no doubt that non-surgical treatment has its place in the scenario of

rotator cuff tears, especially in the case of small, degenerative partial tears, or irreparable tears[3].

However, it should be emphasized that surgical repair of the rotator cuff presents good clinical results, with significant improvement in pain, range of motion, strength, and quality of life, although imaging results, paradoxically, are not always as good[3].

The surgical technique most commonly used today for rotator cuff tears is arthroscopic video-assisted surgery, as it is less invasive than open surgery and has better results regarding postoperative pain, recovery time, morbidity, and aesthetics[4].

Usually, it is recommended to perform subacromial decompression, i.e., acromioplasty, concomitantly with arthroscopy in cases of massive and irreparable rotator cuff tears[4]. Acromioplasty is a surgical arthroscopy of the acromion, in which decompression of the subacromial space is performed to prevent compression of the involved structures[5], a procedure that therefore involves resection of part of the acromion[6]. However, poor-quality rotator cuff muscles, due to tears caused by severely degenerated tendons, may favor re-tear of the repaired tendon with arthroscopic acromioplasty[4].

Thus, the usefulness of acromioplasty is questioned not only in cases of degenerated tendons but also in situations where decompression is performed in isolation, such as in subacromial impingement syndrome, as indicated by some randomized studies and literature reviews[7,8,9,10].

The aim of this study is to quantify the improvement that patients obtained with the arthroscopic procedure performed without acromioplasty, both at the clinical and functional levels.

METHODS

This is a cross-sectional study with patients undergoing arthroscopic treatment of rotator cuff tears at a private tertiary orthopedic hospital located in a city with a population of 1.5 million inhabitants, from October 2021 to November 2022.

The sample consists of consecutive convenience patients with chronic rotator cuff injuries operated on by videoarthroscopy without acromioplasty.

Patients over 18 years old, operated on by the same surgeon; with rotator cuff tears operated on by videoarthroscopy without acromioplasty; minimum follow-up of 01 year were included.

Patients with other shoulder morbidities, rotator cuff tears operated on by open surgery; undergoing rotator cuff surgery associated with acromioplasty were excluded.

Data were collected through the application of a clinical-demographic questionnaire and the functional instruments Western Ontario Rotator Cuff (WORC) Index, American Shoulder and Elbow Surgeons (ASES) Shoulder Index, Simple Shoulder Test (SST), and Subjective Shoulder Value (SSV). Additionally, characterization of pain at rest, during movement, and at night was collected using the Visual Analog Scale. The questionnaire and instruments were individually applied by the researchers in the office or at the patient's home. Range of motion (ROM) assessment consisted of evaluating active and passive shoulder mobility in the upright position using a digital goniometer (Kaptron, Model 360). Researchers who assessed ROM received appropriate training. The shoulder movements measured were: forward flexion, external rotation with 0° abduction, external rotation with 90° abduction, internal rotation in adduction, and internal rotation with 90° abduction. All instruments were collected at a single time point by the study researchers.

The Visual Analog Scale (VAS) is a scale where the patient marks a point on a horizontal or vertical line of 10 centimeters, indicating their shoulder pain at 3 moments: at rest, during movement, and while sleeping. In all cases, the closer to 10, the more intense the pain. Pain intensity is categorized as follows: between 0 and 2 is mild pain, between 3 and 7 is moderate pain, and between 8 and 10 is severe pain[11].

In 2003, Kirkley introduced the English version of the Western Ontario Rotator Cuff Index (WORC), a self-administered instrument specific for rotator cuff pathologies. Its purpose is to assess the quality of life of patients with shoulder complaints due to rotator cuff diseases. It contains 21 items in the form of a Visual Analog Scale (VAS), divided into five domains: physical symptoms (six items), sports and recreation (four items), work (four items), lifestyle (four items), and emotions (three items). All items represent aspects of quality of life that can be particularly influenced by rotator cuff injuries. These domains are based on the World Health Organization's (WHO) definition of health.

Each item is scored on a VAS from zero to 10 cm (the higher the score, the greater the negative impact on quality of life), leading to a minimum score of zero and a maximum score of 2100 (worst possible). In a more clinically understandable format, the maximum score can be expressed as a percentage by subtracting the total score from 2100 and dividing by 2100, resulting in a final score ranging from zero (worst possible) to 100 (best possible)[12].

The American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form (ASES) is divided into 2 sections: one administered by the researcher and another self-administered by the patient. The second section consists of one item related to pain and 10 items related to function. The "pain" item is assessed using a VAS. The other 10 function items are assessed using a four-point Likert scale. The total score ranges from 0 to 100, with higher scores indicating better shoulder function and less pain[13].

The Simple Shoulder Test (SST) is a standardized instrument developed to systematically document shoulder function, assessing functional limitations of the affected shoulder that impair the individual's activities of daily living. It is a questionnaire consisting of 12 yes-or-no questions about the function of the affected shoulder. The questionnaire was designed based on common complaints that patients present to professionals. SST scores for each dimension are calculated by taking the mean of the response alternatives for each question, following the formula: Total Score = $\Sigma y/x$, where y = response for each question in the dimension and x = number of questions for that dimension. This calculation yields a value on the Likert scale of the test for all subscales, regardless of the number of items in each subscale[14].

The Subjective Shoulder Value (SSV) is defined as a subjective assessment by the patient of the affected shoulder expressed as a percentage in relation to a completely normal shoulder, which would have a value of 100%. In other words, the closer to 100%, the closer the shoulder is to normality[15].

The primary outcomes of the study were pain at rest, during movement, and at night, assessed by the Visual Analog Scale as described above, as well as shoulder function, assessed using the SST, ASES, SSV, and WORC instruments. The secondary outcome was range of motion, assessed by digital goniometry.

Regarding the independent variables, we have:

- Age: in years;
- Gender: male/female;
- Affected side: right/left;
- Dominance: right/left;
- Trauma: yes/no;
- Follow-up time in months.

The characterization of demographic profile, clinical data, range of motion, pain, and functional assessment was performed using absolute frequency, relative frequency, mean and standard deviation, median, minimum, and maximum. The distribution of demographic and clinical profiles according to age group was tested using Pearson's chi-square test. The normality of the data was checked using the Shapiro-Wilk test. The reliability and internal consistency of the WORC, SST, and ASES were calculated using Cronbach's alpha. Data were analyzed using the Statistical Package for the Social Sciences (IBM Corporation, Armonk, USA) version 26.0. The significance level adopted was 5% ($p < 0.05$).

The study was approved by the Ethics Committee of HUGO, CAAE No. 02396212.3.0000.0033. All participants signed the informed consent form and agreed to participate in the study.

RESULTS

Out of a total of 33 patients who were the subjects of the study, we were unable to contact 20 for the proper evaluation; two refused to participate in the study; and one was undergoing arthroscopic revision. In the end, the sample consisted of 10 patients.

The demographic and clinical data of the studied sample are in Table 1.

The data regarding the postoperative range of motion of the patients in the studied sample are in Table 2. The values are in degrees, ranging from 0° to 180° in active forward flexion (AFF) and passive forward flexion (PFF), and from 0° to 90° in the other movements.

Regarding active internal rotation in adduction postoperatively, we found that 60% of patients could reach the thoracic spine with their thumb. For passive internal rotation in adduction, the rate of patients who could reach the thoracic spine with their thumb postoperatively was 70%.

The characterization of pain after the procedure is in Table 3. The Visual Analog Scale (VAS) allows the patient to quantify pain, with scores ranging from zero (no pain) to 10 (worst possible pain).

The postoperative characterization of shoulder functional assessment using the instruments is in Table 4. The WORC values are in percentage and range from 0% (worst possible function) to 100% (best possible function). The SST values range from zero (worst possible function) to 12 (best possible function). The ASES values range from zero (worst possible function) to 100 (best possible function). The SSV values range from 0% (worst possible function) to 100% (best possible function).

Table 1. Characterization of demographic and clinical profile (n = 10).

	Age group		Total	*p**
	< 60	≥ 60		
Demographic profile				
Gender				
Female	1 (25.0)	3 (50.0)	4 (40.0)	0.42
Male	3 (75.0)	3 (50.0)	6 (60.0)	

	Age group		Total	*p**
	< 60	≥ 60		
Demographic profile				
Side				
Right	4 (100.0)	5 (83.3)	9 (90.0)	0.38
Left	0 (0.0)	1 (16.7)	1 (10.0)	
Clinical data				
Trauma				
No	2 (50.0)	2 (33.3)	4 (40.0)	0.59
Yes	2 (50.0)	4 (66.7)	6 (60.0)	
Time from symptoms to surgery(months)				
≤ 10	1 (25.0)	2 (33.3)	3 (30.0)	
> 10	1 (25.0)	2 (33.3)	3 (30.0)	0.87
Not informed	2 (50.0)	2 (33.3)	4 (40.0)	
Follow-up time (months)				
≤ 100	1 (25.0)	3 (50.0)	4 (40.0)	
> 100	1 (25.0)	2 (33.3)	3 (30.0)	0.52
Not informed	2 (50.0)	1 (16.7)	3 (30.0)	

*Pearson's chi-square; n, absolute frequency; %, relative frequency

Table 2. Postoperative characterization of range of motion in patients from the study sample (n = 10).

	Mean	Standard deviation	Median	Minimum	Maximum
AAE	148.60	39.29	155.00	56.00	180.00
PAE	168.30	26.52	180.00	110.00	195.00
AERA1	51.00	29.06	48.50	13.00	90.00
PERA1	69.50	22.21	75.50	29.00	90.00
AERA2	61.02	34.86	75.50	0.00	90.00
PERA2	84.20	10.72	90.00	64.00	99.00
AIRA	55.22	21.59	47.50	30.00	90.00
PIRA	71.40	21.74	70.50	39.00	102.00

*AAE, active anterior elevation; PAE, passive anterior elevation; AERA1, active external rotation in adduction; PERA1, passive external rotation in adduction; AERA2, active external rotation in abduction; PERA2, passive external rotation in abduction; AIRA, active internal rotation in abduction; PIRA, passive internal rotation in abduction.

Table 3. Characterization of pain after (n = 10).

	Mean	Standard Deviation	Median	Minimum	Maximum
VAS at rest	1.20	2.30	0.00	0.00	7.00
VAS during movement	3.00	2.58	3.00	0.00	7.00
VAS at night	1.50	2.37	0.00	0.00	7.00

*VAS, Visual Analog Scale

Table 4. Postoperative characterization of shoulder functional assessment using the instruments employed (n = 10).

	Cronbach	Mean	Standard deviation	Median	Minimum	Maximum
WORC	0.92	60.98	21.53	60.37	30.05	95.16
SST	0.73	8.70	2.67	9.00	4.00	12.00
ASES	0.72	80.00	14.72	80.84	51.67	96.67
SSV		76.00	19.55	80.00	50.00	100.00

*WORC, Western Ontario Rotator Cuff Index; SST, Simple Shoulder Text; ASES, Elbow Society Shoulder Index; SSV, Subjective Shoulder Value.

DISCUSSION

The present study demonstrates that patients with complete rotator cuff tears undergoing arthroscopic surgery without acromioplasty showed mild postoperative pain at night and at rest, and moderate pain with movement, as well as good function and range of motion in the operated shoulder.

In this study, the mean value obtained on the Visual Analog Scale (VAS) at rest was 1.33, indicating mild-intensity pain. Similarly, a prospective randomized study with an average follow-up of 7.5 years found a mean of 1.18 for this same question[16]. Another study showed mild-intensity pain (using a different pain scale) after 24 weeks of follow-up[17].

Regarding the VAS, this study also obtained a mean of 1.44 for nighttime pain and 3.33 for pain during movement. Thus, it can be inferred that, although nighttime and resting pain are of mild intensity, pain during movement is moderate. Patients may therefore experience some discomfort when mobilizing the operated shoulder, which is, however, minimized when at rest and during sleep, contributing to their quality of life.

The pain on the VAS during movement has a mean of 3.33, indicating moderate-intensity pain, and the study by Singh also showed moderate-intensity pain (using a different pain scale) with shoulder activity above head level[17].

The nighttime pain on the VAS has a mean of 1.44, indicating mild-intensity pain. The study by Singh also reported mild-intensity nighttime pain (using a different pain scale) after 24 weeks of follow-up[17].

The mean score obtained on the Simple Shoulder Test (SST), as previously shown in the results, was 8.7, indicating good shoulder functionality. The study by Waterman also showed a high mean on the SST, reaching a value of 9.28, which indicates, in line with the present study, good function of the operated shoulder[16].

The mean score on the Elbow Society Shoulder Index(ASES) was 80 out of 100, as shown in Table

4, indicating good shoulder functionality. The study by Waterman, which had a mean follow-up of 7.5 years (similar to the present study), found a mean ASES score of 85.36 out of 100, a value very close to that of this research[16]. Another study with a 2-year follow-up had an ASES score of 91.5 out of 10018.

The value of the Western Ontario Rotator Cuff Index (WORC), as indicated in Table 4, was, on average, 60%, which indicates a result equal to 60% of the full functional capacity of the operated patients' rotator cuffs. The study by Herring showed that after 5 years, the average WORC result was greater than 90% out of 100%[19]. Another study by Alkhatib obtained a WORC score between 75% and 80% for patients with an 11-year follow-up[20]. Therefore, in the present study, the postoperative WORC score was relatively lower compared to the studies mentioned.

The SSV had a mean of 74% in the present study, while another study by Kim obtained an SSV around 90%[21]. Collin found an SSV of 73%, a value very close to that of this study[22].

Regarding the limitations of the study, we can mention that the sample size is small (n = 10). Additionally, despite having a prospective objective, the study has a retrospective nature, which includes a memory bias due to the long-term follow-up. This has a greater impact considering that most evaluated patients were elderly, as there is a physiological memory loss that accompanies the aging process. Another factor inherent to aging is the impairment of comprehension capacity, which may have influenced the study results to some extent, as some older patients were confused by some questions in the applied instruments and required researchers to clarify the issues. Furthermore, it is worth mentioning that the sampling is a convenience type, consecutive, which may have caused a selection bias in the studied sample.

Clinical studies in general bring difficulties for researchers regarding sample selection. In this specific study, as it is an evaluation after several years of the procedure, we had difficulty in obtaining a sample group with a more expressive number of participants. In many cases, patients were not interested in undergoing the evaluation, either because they were satisfied with the postoperative shoulder or because they were avoiding close contact with people outside their family circle during the pandemic period. Thus, in some cases, we had to insist until the patient was willing to participate in the evaluation. In other cases, however, not even insistence was enough, and patients refused to participate. Many of the patients who underwent the procedure in question had changed their phone numbers, and therefore, we could not contact them, which greatly affected the number of participants in the sample. Additionally, we had to make an effort when we found a patient willing to collaborate with the study, offering to go to their homes so that they would not need to travel to the private tertiary orthopedic hospital. In one case, we even traveled to another municipality about 80 kilometers from the hospital to conduct the evaluation of one of the study's patients.

CONCLUSION

The present study demonstrates that patients with complete rotator cuff tears who underwent videoarthroscopic surgery without acromioplasty showed mild nocturnal and resting pain postoperatively, and moderate pain with movement, as well as good function and range of motion of the operated shoulder.

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SCIENTIFIC ARTICLE - CASE REPORT

ESOPHAGEAL SCHWANNOMA: A CASE SERIES

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ABSTRACT

INTRODUCTION: Schwannoma is a neoplasm, usually benign, originating from Schwann cells, responsible for the formation of the myelin sheath in peripheral nerves. It is most frequently found in the peripheral and central nervous systems; however, it can rarely arise in the gastrointestinal tract. It presents an intramural location. Objective: To report a series of cases of Esophageal Schwannoma (ES).

METHOD: Review of the results of 65,484 upper digestive endoscopy (UDE) exams, performed at a Private Clinic in Goiânia-GO, and their respective biopsies. Results: Of these exams, 12 (0.018%) cases of ES were diagnosed, with a mean age of 43.4 ± 5.2 years, ranging from 17 to 82 years. Eight (66.6%) were female. The most common site of involvement was the distal esophagus (76.9%).

CONCLUSION: ES is a rare tumor in the digestive tract. In the present study, it was found in 0.018% of UDE exams. We observed a higher prevalence in females (66.6%). The distal esophagus was the most affected segment (76.9%).

Keywords: schwannoma; Esophageal Schwannoma; mesenchymal tumors of the gastrointestinal tract.

INTRODUCTION

Mesenchymal neoplasms involving the gastrointestinal tract (GIT) are typically intramural, and they are divided into two main groups: gastrointestinal stromal tumors (GISTs) and tumors similar to those occurring in soft tissues.[1, 2,3,6].

The subgroup of GISTs encompasses the most common mesenchymal tumors of the GIT [2]. These neoplasms are most frequently located in the stomach and proximal small intestine but can occur in any part of the digestive tract and occasionally in the omentum, mesentery, and peritoneum[2]. They are primarily identified by the expression of the KIT protein and often exhibit activating mutations in the KIT or platelet-derived growth factor receptor alpha (PDGFRA) genes [2,5].

The other, rarer subgroup is composed of tumors identical to those that can arise in soft tissues throughout the rest of the body [2]. This group of neoplasms includes lipomas, liposarcomas, leiomyomas, true leiomyosarcomas, desmoid tumors, schwannomas, and tumors of the peripheral nerve sheath [2].

Schwannomas, on the other hand, are solitary neurogenic tumors, with the majority being benign 6, arising from cells of the neural myelin sheath [1]. They are most commonly found in the peripheral and central nervous systems; however, they can rarely arise in the gastrointestinal tract [1,2,4,8,10,11]. The stom-

ach is the most common site for schwannomas, but they can also be rarely found in the retroperitoneum, esophagus, colon, and rectum[4,5].

Intra-abdominal schwannomas occur equally in men and women, without a peak incidence by age group[4]. Diagnosis typically occurs after excision of the lesion with histopathological study[8,9]. Definitive treatment involves complete resection of the lesion with negative margins[8].

Given the scarcity of data on the prevalence of Schwannomas involving GIT, we conducted a study to evaluate the prevalence of esophageal schwannoma in a private Gastroenterology and Endoscopy clinic in Goiânia-GO.

METHOD

This is a retrospective prevalence study, where we reviewed the results of upper gastrointestinal endoscopy (UGIE) exams and their respective biopsies performed at a private Gastroenterology and Endoscopy clinic in Goiânia-GO.

During the study period, 65,484 UGIE exams were performed. We reviewed the medical records of these patients and evaluated age, gender, endoscopic findings, and histopathological findings. We included in the study all patients who underwent UGIE during the period and excluded exams performed on the same patient and those where the presence of Schwannoma was not confirmed by histopathology.

RESULTS

Out of the 65,484 exams performed, we diagnosed 17 cases (0.03%) with endoscopic suspicion of esophageal Schwannoma (ES). Of these, three cases were repeated exams in the same patient, and in two cases, the histopathological exam was compatible with leiomyoma. The remaining 12 patients (0.02%) had a histopathological diagnosis of Schwannoma and composed the study population.

Of these, eight patients (66.6%) were female. The mean age of the group was 43.4 ± 5.2 years, ranging from 17 to 82 years. In 11 patients (91.6%), the lesions were solitary, and in one patient (8.4%), two lesions were identified. The size of the lesions ranged from 2 to 20 mm. Regarding the site of the lesions, the most common site of involvement was the distal esophagus, where ten lesions were found (76.9%), with two lesions (15.4%) in the middle esophagus and one (7.7%) in the proximal esophagus. In all cases, endoscopic treatment was possible without complications.

DISCUSSION

Benign primary tumors of the esophagus account for 2% of cases; of these, 80% are leiomyomas and only 1% are Schwannomas [2]. Schwannomas are tumors, in most cases, with benign behavior [4,6], derived from Schwann cells, responsible for the formation of the myelin sheath of nerves [4]. The most common location is in the central and peripheral nervous system [4], being rarely found in the gastrointestinal tract, where the most common site is the stomach [4,5]. They can also rarely be seen in the esophagus, colon, rectum, and retroperitoneum [1,2,3,4,5].

The ES was first described by Chatelin and Fissore in 1967 [7,8]. It is a rare type of benign mesenchymal tumor of the esophagus, with a higher incidence in Asia [8]. The average age of incidence is around 50-60 years[5]; however, in this study, the mean age was slightly lower (43.4 ± 5.2 years). The ES appears to have an equal distribution in both sexes4; however, in the present study, it was twice as prevalent in females.

Patients with ES can be asymptomatic or present with a wide variety of symptoms, including ab-

dominal pain, intestinal constipation, nausea, and vomiting [3,5]. Some patients may experience dyspnea due to compression of the trachea by the tumor [9,10]. However, the most common clinical manifestation is dysphagia [3,10].

Diagnosis is typically suspected through EGD 3,10, with confirmation achieved through histopathological study of the lesion and immunohistochemistry [1,3,4,7,8,10]. Biopsy findings commonly include cellular pleomorphism, presence of lymphoid follicles, rare mitotic figures, and occasional areas of necrosis [4,8]. Tumor cells are immunohistochemically positive for S100 [1,3,4,6], a characteristic marker of Schwann cells[8,9], and negative for smooth muscle markers such as SMA, CD34, and CD117 [3,4,10].

The treatment strategy for gastrointestinal Schwannomas is based on size, location, and association with surrounding tissues; available treatment modalities include endoscopic and surgical resection.[11] Surgical resection remains the standard and most effective treatment, involving complete tumor removal with a margin of safety.[4,5,8,10] Endoscopic resection can serve as an alternative method for selected patients and may be attempted in gastrointestinal schwannomas with a diameter <3 cm and no signs of malignancy.[11] Radiation therapy and chemotherapy seem to have no benefit in treating this condition.[3,10] After complete resection, the prognosis is usually favorable, as tumor recurrence is rare [4,8].

CONCLUSSION

ES is a rare mesenchymal tumor of the upper digestive tract. In the present study, we observed a prevalence of 0.018%. Although there is no distinction between sexes in the literature, there was a higher prevalence in females in our population (66.6%). The mean age of our population was slightly lower than reported. The distal esophagus was the segment most affected (76.9%). All cases were treated endoscopically. Larger studies are needed to outline the epidemiological profile of this rare tumor.

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SCIENTIFIC ARTICLE - CASE REPORT

ROBINOW SYNDROME: CASE REPORT

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ABSTRACT

Robinow Syndrome is a rare genetic disease, autosomal dominant or recessive, due to mutations in the WNT5A and ROR 2 genes with short stature, genitourinary changes, facial changes and important musculoskeletal abnormalities, such as mesomelic or acromelic shortening of limbs, brachydactyly, clinodactyly, vertebral anomalies such as hemivertebrae with fusion of thoracic vertebrae and short stature. The objective of this paper is to report a rare case of Robinow Syndrome.

Keywords: Robinow syndrome; musculoskeletal abnormalities.

INTRODUCTION

Robinow syndrome, also known as "fetal face syndrome," is a rare genetic disorder with autosomal dominant or recessive variants, due to mutations in the WNT5A and ROR 2 genes, respectively, mostly linked to consanguineous marriages. This disease is characterized by symptoms and signs such as short stature, genitourinary abnormalities, facial alterations, and significant musculoskeletal abnormalities [1-5].

The skeletal abnormalities of Robinow syndrome tend to be severe. The main orthopedic changes found in patients with this syndrome are mesomelic or acromelic limb shortening, brachydactyly, clinodactyly, vertebral anomalies such as hemivertebrae with fusion of thoracic vertebrae, and short stature. At the request of the Medical Genetics team, due to skeletal alterations, the orthopedic team was requested to follow up with the patient. It is important for the orthopedic team to be familiar with Robinow syndrome and thus be able to manage the musculoskeletal alterations in these patients [1-5].

The objective of this study is to report a rare case of Robinow syndrome, describing the characteristics of the musculoskeletal alterations.

CASE REPORT

Patient, 9 years old, male, son of a consanguineous couple with a sibling who is healthy. At birth, he presented with omphalocele, cryptorchidism on the right side, gingival hypertrophy, and septated hydrocele. On physical examination: hypertelorism, exophthalmos, anteverted nares, short nasolabial filter, thick lips, tented upper lip, gingival hypertrophy, clinodactyly and camptodactyly of the 5th fingers of the hands, pectus excavatum, and bilateral painless flexible flat feet.

X-rays of the hands demonstrating hypoplasia of the middle phalanx of the 5th digits (Figure 1), x-rays of the feet showing widened metatarsals and phalanges bilaterally, also noting bilateral fallen arches with flexible flat feet (Figure 2), and x-ray of the spine showing mild scoliosis (Figure 3). Bone densitometry revealing bone mass adequate for age but at the lower limit (Figure 4).

Figure 1 - Anteroposterior radiograph of hands demonstrating hypoplasia of the middle phalanx of the 5th digits.

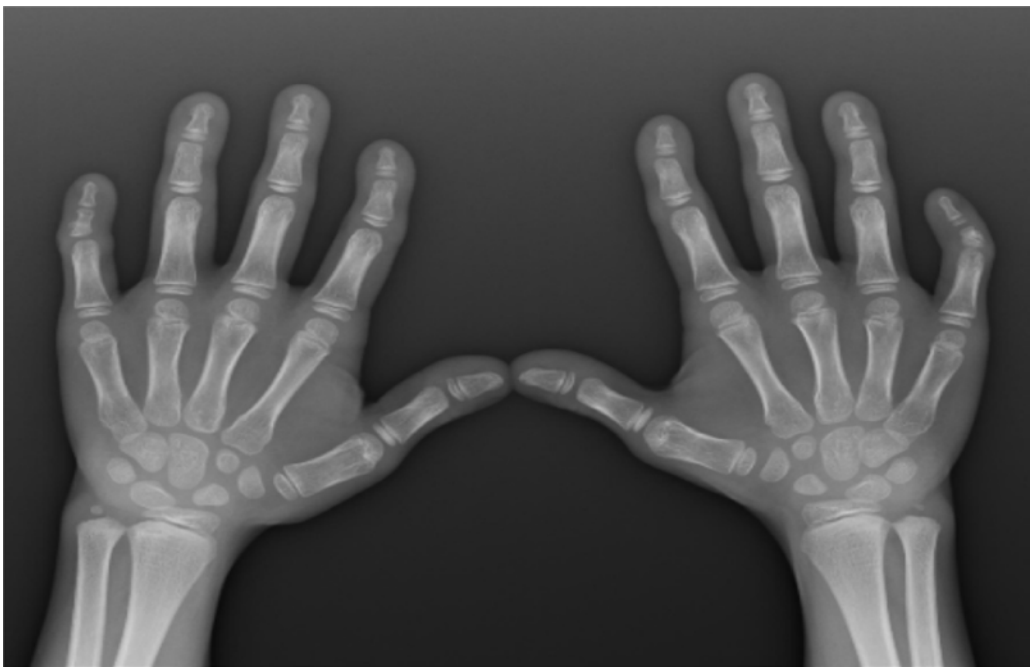


Figure 2 - Weight-bearing foot radiograph showing bilateral widening of the metatarsals and phalanges, with bilateral flat feet and dropped arches.

Figure 3 - Dorsolumbar spine radiograph showing mild scoliosis.

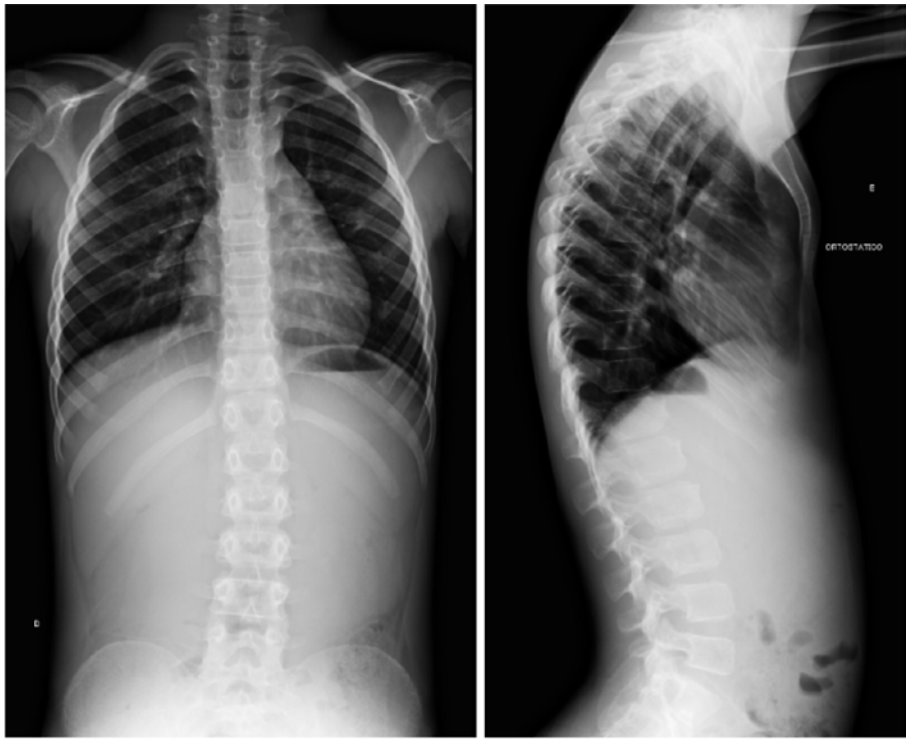
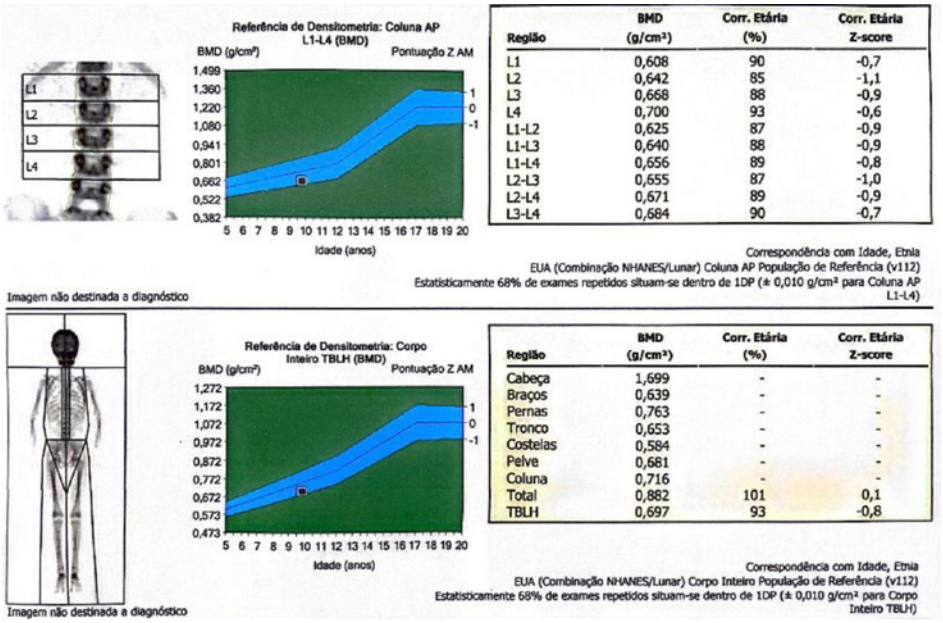


Figure 4 - Bone densitometry with normal bone mass at the lower limit.



Região	BMD (g/cm²)	Corr. Etária (%)	Corr. Etária Z-score
L1	0,608	90	-0,7
L2	0,642	85	-1,1
L3	0,668	88	-0,9
L4	0,700	93	-0,6
L1-L2	0,625	87	-0,9
L1-L3	0,640	88	-0,9
L1-L4	0,656	89	-0,8
L2-L3	0,655	87	-1,0
L2-L4	0,671	89	-0,9
L3-L4	0,684	90	-0,7

Região	BMD (g/cm²)	Corr. Etária (%)	Corr. Etária Z-score
Cabeça	1,699	-	-
Braços	0,639	-	-
Pernas	0,763	-	-
Tronco	0,653	-	-
Costelas	0,584	-	-
Pelve	0,681	-	-
Coluna	0,716	-	-
Total	0,882	101	0,1
TBLH	0,697	93	-0,8

DISCUSSION

Robinow syndrome, first described in 1969 by Meinhard Robinow, is a rare genetic disorder characterized by short stature, mesomelic limb shortening, external genitalia hypoplasia, gingival hyperplasia, and typical facial features (hypertelorism, midface hypoplasia, large nasal bridge, short upturned nose, and anteverted nostrils). With fewer than 200 reported cases, it is of autosomal origin, both dominant and recessive, with the latter being the more severe form [1].

Serum hormone levels showed a growth hormone (GH) deficiency and low basal levels of testosterone during sexual development and differentiation, which normalize during puberty. Additionally, a partial insensitivity of Leydig cells to human chorionic gonadotropin and a defect in the feedback mechanism of sex hormones were observed [2].

The autosomal recessive variant is characterized by skeletal abnormalities: shortening of long bones of the major limbs, especially forearms, brachydactyly, abnormal curvature of the spine due to bone deformities in the spine, short stature, and fused or absent ribs in certain areas. Additionally, defects in vertebral segmentation are common but more severe in the recessive form: hemivertebrae and scoliosis [3].

The recessive variant of Robinow Syndrome originates from mutations in the ROR2 gene (9q22), which result in premature stop codons, leading to non-functional proteins. Mutations in this gene prevent the production of any functional ROR2 protein, which plays a critical role in the formation of the skeleton, heart, and genitals. This interruption in development before birth triggers the characteristic symptoms of the syndrome [4].

The dominant form, on the other hand, presents more severe intraoral characteristics (wide retromolar ridge, deformation of the alveolar ridge, malocclusion, gingival enlargement, dental crowding, and hypodontia) than the recessive form. Autosomal dominant Robinow Syndrome has a heterogeneous genetic origin, being associated with mutations in the WNT5A gene (3p14), DVL1, DVL3 [5].

The diagnosis of Robinow Syndrome is mostly clinical and is made by identifying characteristic anomalies. Radiological exams are performed as a complement to confirm the presence of skeletal malformations. Additionally, molecular genetic tests can identify a heterozygous pathogenic variant in DVL1, DVL3, or WNT5A [1-5].

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SCIENTIFIC ARTICLE - CASE REPORT

GASTROPLASTY IN A PATIENT WITH VON WILLEBRAND DISEASE: CASE REPORT

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ABSTRACT

Von Willebrand Disease (VWD) is an autosomal hereditary bleeding disorder defined by decreased activity of Von Willebrand Factor in the blood. It may be secondary to a quantitative or qualitative defect. This case report addresses a patient with VWD and obesity who underwent gastroplasty at a Hospital in Goiânia. With a hematologist's recommendation for the use of factor VIII 2500 IU, to be performed 1 hour before the surgical procedure, with a subsequent maintenance dose for 5 days. In the operating room, total intravenous anesthesia was performed, with Propofol and Remifentanil. The procedure was uneventful and after 24 hours of hospital stay, the patient was discharged by the team.

Keywords: Von Willebrand Diseases; Anesthesia; Hematology.

INTRODUCTION

Von Willebrand Disease (VWD) is an autosomal inherited bleeding disorder defined by reduced von Willebrand factor (VWF) activity in the blood. It can be secondary to a quantitative or qualitative defect. VWD is characterized by three main subtypes: type 1, which is characterized by a partial quantitative deficiency of VWF; type 2, which is characterized by a qualitative deficiency; and type 3, which is characterized by a complete deficiency of VWF. [1]

Among the main symptoms are mucocutaneous bleeding, including epistaxis, easy bruising, and even heavy menstrual bleeding, as well as increased bleeding during surgical/invasive procedures. In this case, the patient has VWD and underwent a gastroplasty with a recommendation from the hematologist for factor VIII replacement before the surgical procedure. Another potential therapeutic option would be desmopressin, which stimulates the endothelial release of stored VWF and factor VIII, along with adjuvants such as tranexamic acid.[2]

The present case report aims to describe the clinical/anesthesiological management of a patient with VWD undergoing elective gastroplasty.

CASE REPORT

24-year-old female patient, ASA [2], with obesity, VWD, and generalized anxiety disorder, on continuous use of sodium valproate, lithium carbonate, and fluoxetine. She is willing to undergo gastroplasty

at a hospital in Goiânia. In the pre-anesthetic consultation, a hematologist's report was presented indicating the use of factor VIII 2500 IU, to be administered 1 hour before the surgical procedure, with a subsequent maintenance dose for 5 days. Additionally, in case of bleeding during or at the end of surgery, another dose was allowed immediately postoperatively. Total intravenous anesthesia was administered for the surgery, following all recommendations made by the hematologist.

In the operating room, the patient was properly monitored with a pulse oximeter with plethysmographic curve, electrocardiogram, and non-invasive blood pressure, presenting stable vital signs before anesthetic induction. She received a venous catheter with a 20G catheter in the right upper limb. She underwent total intravenous anesthesia: Preoxygenation with a facial mask with 100% oxygen (6L/min) for 3 minutes. Anesthesia was induced with propofol (150 mg), sufentanil (15 mcg), rocuronium (20 mg), and lidocaine (80 mg). A periglottic block was performed with ropivacaine 0.5%, 5ml of the solution, and the trachea was intubated with a 7.0 cuff tube. Cormack-Lehane laryngoscopic classification 2A (only the posterior portion of the glottic cleft visible), direct and atraumatic laryngoscopy confirming the correct tube placement by capnography, with mechanical ventilation adjusted to maintain an end-tidal carbon dioxide pressure (PETCO2) close to 35 mmHg. Anesthetic maintenance occurred with propofol and remifentanil target-controlled as per the physician's discretion. Adjuvant medications used were dipyrone 2g, cephalexin 4g, nausedrom 8 mg, buscopan compound, dexamethasone 10mg, ondansetron 8mg, pantoprazole 40mg, and precedex 50 mcg.

The intraoperative period proceeded without hemorrhagic complications, and the patient maintained stable vital signs throughout the anesthetic period. At the end of the surgical procedure, neuromuscular blockade was reversed with Sugamadex 200 mcg, and after a few minutes, the patient woke up followed by uneventful extubation. The patient was then transferred to the post-anesthetic care unit (PACU), where morphine 10mg was administered for post-operative analgesia. After 1 hour in the PACU, the patient was transferred to a hospital room, where she stayed for 24 hours, receiving the factor VIII as instructed by the hematologist. Due to her good condition and absence of bleeding, the patient was discharged from the hospital.

DISCUSSION

Von Willebrand Disease (VWD) is the most common autosomal hereditary bleeding disorder along with hemophilia A, with an estimated prevalence of 1 in 1,000 individuals. It can be better determined by the decrease in von Willebrand factor (VWF) activity in the blood, which can be secondary to a quantitative or qualitative alteration. [1,3,4]

The VWF is a multimeric plasma glycoprotein whose main functions are to facilitate platelet adhesion to the injured vascular endothelium by binding to the platelet membrane, as well as to act as a carrier and stabilizer of factor VIII in the plasma. [5]

There are several subtypes of VWD that require individualized treatment based on the specific diagnosis, bleeding phenotype, and specific clinical context. The main symptoms include mucocutaneous bleeding, including epistaxis, easy bruising, menorrhagia, as well as bleeding during surgery and other invasive procedures. [2]

VWD is classified into 3 main categories: partial quantitative deficiency of VWF (type 1), complete deficiency (type 3), and qualitative deficiency (type 2). Type 2 is further classified into subtypes defined by defects in multimerization (type 2A), increased platelet binding (type 2B), defects in VWF-platelet or

VWF:CB binding (type 2M), or defects in factor VIII (FVIII) binding (type 2N). Type 1 is the most common, accounting for about 85% of VWD, while type 3 is the least common, affecting about 1 in 1 million individuals. The diagnosis of VWD includes evaluation of the history of hemorrhagic symptoms, assessment of the family history of bleeding or VWD, and confirmatory laboratory tests. [1]

Clinical laboratory tests for VWD include initially measuring at least VWF:Ag, VWF-platelet binding activity (VWF:RCo, VWF:GPIbM, and VWF:GPIbR), and FVIII levels. Additional tests may be indicated based on the results of the initial test, including low-dose ristocetin-induced platelet aggregation (VWF:RiCo), VWF multimers, and von Willebrand factor propeptide (VWFpp) levels. [1,6]

In a case described by Saurote, a case of a patient with von Willebrand disease (VWD) undergoing a mitral valve replacement is presented. Similar to the reported case, intensive care was provided in the preoperative, intraoperative, and postoperative periods with factor VIII replacement. At the end of the process, the patient progressed without complications and with good clinical evolution, allowing her to be discharged after a few days of hospitalization and observation. [5]

The main therapies include the use of desmopressin to induce the endothelial release of stored von Willebrand factor (VWF) and factor VIII and the use of VWF concentrates, including plasma-derived and recombinant products, as well as adjunctive therapies such as the antifibrinolytic agent tranexamic acid. Management remains challenging due to the significant variability in bleeding symptoms among patients, variability in clinical practice, and lack of high-quality evidence to guide decision-making. [2]

CONCLUSION

VWD is an autosomal hereditary disease, as stated, increasing the risk of bleeding intraoperatively and postoperatively, therefore, it can be concluded that good preventive medical care is essential to avoid complications. Strengthening bonds with assisting physicians, especially hematologists, and with the patient herself in a prior consultation is of notable importance for her care in the surgical center, as with these measures, a more dignified care with fewer risks to the patient can be planned. In the case reported here, the use of factor VIII in the pre-, peri-, and postoperative periods was able to prevent undesirable bleeding.

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SCIENTIFIC ARTICLE - CASE REPORT

AUTOSOMAL DOMINANT POLYCYSTIC KIDNEY DISEASE: CASE REPORT

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ABSTRACT

Autosomal Dominant Polycystic Kidney Disease (ADPKD) is characterized by the progressive development of numerous bilateral renal cysts that encroach upon the functional parenchyma, culminating in renal function loss and Chronic Kidney Disease. Additionally, there are extrarenal involvements, meaning cysts arise in different bodily systems. The objective is to investigate ADPKD in a patient, aiming, through a case report, to explore updates on diagnosis, treatment, and the epidemiological situation of the disease in the country. This case report described a 65-year-old patient complaining of lower back pain associated with hypertension and subsequent diagnosis of Autosomal Dominant Polycystic Kidney Disease. The diagnosis of ADPKD is based on imaging exams and the patient's family history. Treatment for ADPKD, in turn, is related to renal and extrarenal complications of the disease, aimed at limiting morbidity and mortality. The search for family history indicating the manifestation of characteristic symptoms and signs of the disease is of utmost importance as it is a genetically inherited condition, and the earlier the diagnosis, the better the quality of life associated with its carriers.

Keywords: Autosomal dominant polycystic kidney disease; bilateral renal cysts; chronic kidney disease.

INTRODUCTION

Autosomal Dominant Polycystic Kidney Disease (ADPKD) is defined by the progressive development of numerous bilateral renal cysts that encroach upon the functional parenchyma, culminating in kidney function loss and Chronic Kidney Disease (CKD)[1]. Additionally, there are extrarenal involvements, meaning cysts arise in different body systems. In this context, it is important to emphasize that ADPKD is the most common hereditary renal pathology in humans, presenting genetic heterogeneity, i.e., they are diseases that manifest with similar phenotypic traits but can be caused by mutations in different genes[2].

Understanding the disease involves understanding, according to the literature, that ADPKD is present from intrauterine life, clinically manifesting in adulthood. Furthermore, in the majority of cases, this disease is asymptomatic, which explains the fact that only 50% of carriers are diagnosed. In this analysis, the confirmation of the clinical condition occurs only between the third and fourth decades of life through routine exams or genetic analysis[3].

Among the clinical manifestations related to ADPKD, Systemic Arterial Hypertension (SAH) is present in 66.7% of patients, being the most prevalent associated disease, which is related to the increased renal

debility that precedes kidney function loss and establishes a factor in CKD progression[1,3]. In this context, other manifestations are noted, such as nephrolithiasis, renal failure, portal hypertension, gastrointestinal bleeding, esophageal varices rupture, thrombocytopenia, splenomegaly, cholangitis, and jaundice[4].

The present study aims to investigate ADPKD in a patient, seeking, through a case report, to explore updates on diagnosis, treatment, and the epidemiological situation of the disease in the country.

CASE REPORT

Patient DPCM, female, 65 years old, attended the nephrologist's office with complaints of low back pain associated with hypertension. With a family history of kidney disease, her mother died due to an unspecified nephropathy, and her siblings are carriers of ADPKD.

The patient denied complaints such as recurrent cystitis, hematuria, and urinary changes, which are commonly found in this disease. On physical examination, there were no changes on palpation of the abdomen. She presented Giordano's sign, which indicates inflammation of the renal parenchyma upon percussion.

Laboratory tests revealed creatinine 4.7 mg/dL, urea 129 mg/dL, hemogram showing hemoglobin = 10.8 g/dL, hematocrit = 32.5%, 7,000 leukocytes, 263,000 platelets /mm3, aspartate aminotransferase 15 U/L, and alanine aminotransferase 17 U/L.

She underwent an abdominal ultrasound which revealed both kidneys to be enlarged, consisting of several medium-sized cysts. The image of the left kidney is presented below (the appearance is similar to that of the right kidney) (Figure 1).

Figure 1: Ultrasound image of the left kidney

Treated clinically with atenolol, chlorthalidone, furosemide, losartan, amlodipine. Currently maintains renal function and partially controlled hypertension. The nephrology service evaluation opted for the creation of an Arteriovenous Fistula (AVF) in the right arm, anticipating a future need for hemodialysis.

DEVELOPMENT

Autosomal Dominant Polycystic Kidney Disease (ADPKD) is a hereditary disease, classified as a multisystem monogenic disorder, and presents genetic heterogeneity, being the most common among humans. It originates from the growth and development of multiple bilateral renal cysts that destroy the functional parenchyma, as well as from extrarenal manifestations, evidencing cysts in other organs, cardiac valvular abnormalities, cerebral aneurysms, abdominal hernias, body pains, calculous cholecystopathy, and diverticular disease[1].

The prevalence of ADPKD is reported to be 1 in 400 to 1 in 1000 live births, in studies in Denmark and the United States. Based on this prevalence, it is presumed that more than 10 million people worldwide, considering all ethnic groups, have ADPKD, thus constituting the greatest public health problem[5].

In patients undergoing dialysis treatment, ADPKD affects between 13.4% and 5% of patients in the United States and Europe, respectively. In Brazil, on the other hand, the frequency in dialysis patients varies from 3% to 10.3%. Furthermore, regarding prevalence, there is only one study conducted in the national territory that analyzed the existence of 9.1 cases per 100,000 inhabitants in the northwest region of the state of Paraná[6]. Additionally, it is important to note that prevalence studies in autopsies suggest much higher numbers of individuals identified with the disease. This information suggests the existence of ineffective diagnoses[5].

When it comes to factors that entail a high risk for ADPKD patients, the male gender is a determining factor in the disease's worse progression. As a result, men require kidney transplantation at an earlier stage due to this and other gender-related risk factors, such as diagnosis before the age of 30, increased kidney size, and hormonal influence[4].

Regarding the pathology of the disease, it is related to the dysfunction of two genes: PKD1 and PKD27. These genes are responsible for encoding, respectively, the proteins Polycystin 1 (PC-1) and Polycystin 2 (PC-2), which are proteins related to cell multiplication and differentiation and substance transport. Patients with mutations in PKD1 progress more rapidly to Chronic Kidney Disease (CKD) stage five and have a larger kidney size compared to individuals with mutations in PKD2, who form fewer cysts[6].

In the context of genetic mutations, gene dysfunctions lead to erroneous production of proteins related to the genes. In this sense, the regulatory function of PC-1 on the activity of PC-2 does not occur, which causes problems in intracellular Ca++ concentrations, and the product of PC-1 cleavage, important for maintaining the integrity of distal nephrons, is not formed. Furthermore, genetic dysfunction influences the movement of chloride through Na+-K+-2Cl- cotransporters positioned in the basolateral membrane of the cystic epithelium, contributing to cystic expansion[8].

As a multisystemic disease, ADPKD presents with both renal and extrarenal manifestations in clinical cases. Firstly, renal manifestations include defects in urine concentration, reduced renal blood flow, hypertension -and consequent target organ damage-, hemorrhagic cyst, among other conditions. On the other hand, extrarenal manifestations include polycystic liver disease, intracranial aneurysm, vascular abnormalities such as thoracic aortic dissection, valvular heart disease, and cyst formation in various organs such as the pancreas and arachnoid membrane[7].

Regarding the clinical aspect, it is also important to highlight that hypertension is the main sign that deserves attention for the suspicion of ADPKD, and treatment is indicated in 70% of cases. Furthermore, gastrointestinal bleeding, esophageal varices rupture, thrombocytopenia, splenomegaly, jaundice, and cholangitis are highlighted as indicators of the disease[4].

The diagnosis of ADPKD is based on imaging exams and the patient's family history. For imaging exams, an Ultrasonography (USG), Computed Tomography (CT), or Magnetic Resonance Imaging (MRI) of the kidneys can be performed, in which multiple cysts may be observed, increasing in number with age. It is important to highlight that USG is the first choice due to its low cost, while MRI is preferred for quantifying renal volume[7].

Molecular diagnosis is also of great value in some cases where there is suspicion of ADPKD and cannot be evaluated by conventional methods. For this, gene linkage analysis, direct gene testing, and DNA sequencing are performed[7].

Treatment for ADPKD is related to renal and extrarenal complications of the disease, aimed at limiting morbidity and mortality. The main situations are related to flank pain, with tricyclic antidepressants, analgesics, and opioids being used for proper management. Additionally, in cases where there is a decrease in hematocrit and hemodynamic instability related to severe complications of hemorrhagic cysts, hospitalization and blood transfusion are opted for, while in mild cases caused by these cysts, only rest, analgesics, and fluid intake are recommended. On the other hand, kidney transplantation is a definitive option for ADPKD in patients who meet the criteria for this treatment[9].

Hypertension, the main sign associated with ADPKD, deserves attention regarding therapeutic management related to the disease. In this situation, healthcare professionals use antihypertensive drugs such as angiotensin-converting enzyme inhibitors (ACE inhibitors) or angiotensin receptor blockers (ARBs) to prevent the progression of renal damage, which is already so prominent due to the progression of ADPKD. It is also important to note the existence of infectious cystic conditions related to urinary tract infection, which are treated with antibiotics[7].

In the analysis of therapeutic approaches related to ADPKD, the progression of understanding the genetic and molecular bases involved in the pathogenesis of the disease, such as the mechanisms of cyst development and growth, has enabled the use of substances in clinical trials. In this context, molecules such as the mammalian target of rapamycin inhibitors (mTOR) stand out. This molecule has been shown to decrease the number of cysts in animals that use it compared to the control group. Furthermore, V2 receptor antagonists related to vasopressin have been shown to be effective in reducing the frequency of situations related to ADPKD, such as renal pain, urinary tract infection, and hematuria[9].

CONCLUSION

ADPKD is a condition with different nuances, as it goes beyond renal dysfunction as a consequence. In this context, the complexity of the mechanisms that generate the disease at the renal level stands out, which are related to cyst formation and, subsequently, organ dysfunction.

In this scenario, the search for family history indicating the manifestation of characteristic symptoms and signs of the disease is of paramount importance because it is a genetic disorder. On the other hand, early screening, mainly through ultrasound, is essential to improve the quality of life of ADPKD carriers early on.

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SCIENTIFIC ARTICLE - CASE REPORT

PAGET'S DISEASE OF BONE: CASE REPORT

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ABSTRACT

Paget's Disease of Bone (PDB) is a complex condition that affects bone tissue and can lead to a series of complications if not properly diagnosed and treated. The classic symptoms of PDB, such as bone pain, deformities and neurological complications, can vary significantly in their clinical presentation. This case report illustrates an atypical patient, since the onset of manifestations and diagnosis occurred before the age of 50, a fact which occurs rarely. The importance of considering this condition in the differential diagnoses of pain and bone deformities is highlighted, even in younger patients, enabling early treatment of this morbidity.

Keywords: Paget's disease; Osteitis Deformans; Bone Remodeling.

INTRODUCTION

Paget's disease of bone (PDB) is a skeletal disorder characterized by increased bone remodeling, where osteoblasts and osteoclasts function excessively, resulting in increased bone components with sclerotic and lytic areas. The main affected sites are the vertebrae, long bones of the lower limbs (femur and tibia), pelvis, and skull. Men tend to be more affected than women, both at an older age, with it being rare before the age of 50. Family history also proves to be an important factor in patients with the disease, being positive in about 20% of cases, in which SQSTM1 is the main gene involved in pathogenesis[1-3].

The clinical presentation of the disease is characterized by bone pain and deformities, an increased risk of stress fractures, and consequently, complete fractures. Additionally, hearing loss, basilar invaginations leading to cerebellar dysfunction, obstructive hydrocephalus, and aortic stenosis may occur[3,4]. Diagnosis is made through a combination of the patient's clinical presentation, imaging studies, and laboratory abnormalities. Among the tests, conventional radiography of the affected bone is notable, showing increased bone structure with osteolytic lesions resembling a candle flame, sclerotic changes, and cortical thickening[2].

Treatment involves lifestyle modifications with physical activities and physiotherapy. Bisphosphonates are the treatment of choice for people with PDB, due to their high efficacy in suppressing bone resorption and consequently reducing bone pain. Zoledronic acid is more effective than other bisphosphonates, such as pamidronate and risedronate[5-7]. Orthopedic surgery may be necessary for correction of bone deformities, secondary degenerative arthropathy, and decompression of affected nerves[3,8,9]. Therefore, the objective of this study is to report a case of a patient diagnosed with PDB at a less common age, already presenting deformities at the time of diagnosis.

CASE DESCRIPTION

Male patient, 48 years old, born in Jacobina-BA, truck driver, presented to the Rheumatology outpatient clinic referred by the Orthopedics service for investigation of left thigh pain, even at rest and worsened with movement, starting 2 years before with worsening in the last 8 months, without local trauma. He did not present weight loss and had no other systemic complaints. He denied other symptoms, such as pain in other sites, craniofacial changes, or visual or auditory alterations. He had no previous comorbidities and did not use any continuous medications. He denied smoking and alcohol consumption and played soccer as physical activity. During the investigation of the family history, he mentioned a case of bone neoplasia but could not specify. On general physical examination, he did not present any significant alterations, including normal cardiac auscultation. During musculoskeletal evaluation, a bowing deformity was identified in the region near the left thigh (Figure 1), without local inflammatory signs and no crepitus during movement.

Figure 1. Bowing deformity in the region near the left thigh.

He brought the following complementary exams: alkaline phosphatase 997 U/L (reference range: 40-150 U/L); 25-OH vitamin D 24.3 ng/mL; normal complete blood count and liver enzymes. Additionally, he underwent a hip radiograph, visualized in Figure 2.

Figure 2. Conventional radiograph of the left femur showing an expansile appearance with cortical thickening (bone formation) and interspersed lytic areas (resorption).

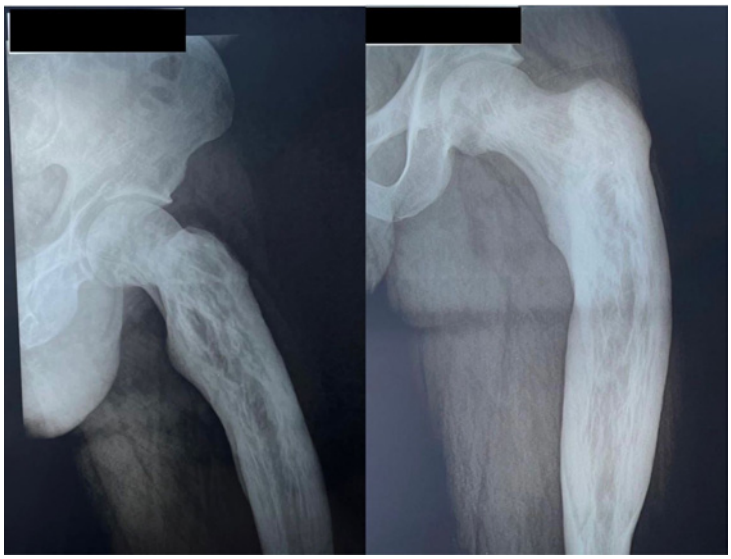
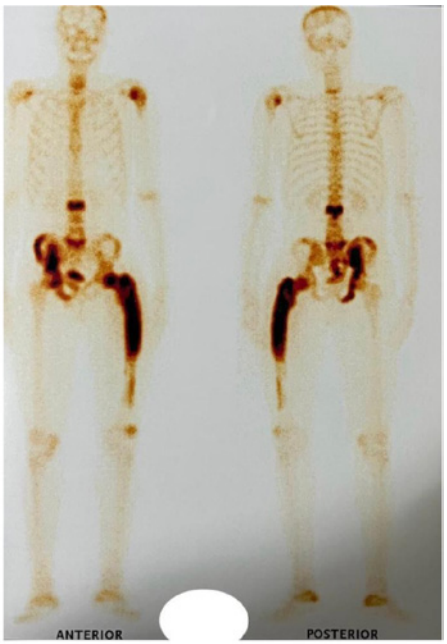


Table 1 lists the complementary exams requested for further investigation, with the bone scintigraphy shown in Figure 3.

Table 1. Additional laboratory and imaging investigation

Laboratory Tests	**Results**
Total calcium	8.3
Creatinine	0.8
Protein electrophoresis (PEP)	0.83
Parathyroid hormone (PTH)	57
Imaging Exams	**Results**
Left hip computed tomography	- There is a significant corticoperiosteal thickening of the middle and proximal third of the femur with altered bone trabeculation, noting areas with fat attenuation coefficients interspersed with nonspecific appearance, but accepting Paget's disease as the main differential diagnosis, it is advisable to perform follow-up for evolution control. - Mild alteration of bone trabeculae in the body of the left iliac bone as well as in the last vertebra at the thoracolumbar transition; femoral bowing of probable chronic nature, with no evidence of fractures.
Bone scintigraphy with 99mTc	- abnormal increase in radiotracer concentration in the following regions: skull (left parietal bone); proximal left humerus; spine (C6, L2 with an expansile appearance, L5, sacrum); right hemipelvis with an expansile appearance; left femur with an expansile appearance; knees with mild involvement; and feet, specifically the calcanei. Conclusion: bone lesions suggestive of polyostotic Paget's disease of bone.

Figure 3. Abnormal increase in radiotracer concentration mainly in the skull, proximal humerus, spine with L2 showing an expansile appearance, right hemipelvis with an expansile appearance, and left femur with an expansile appearance.



After evaluating these clinical data, a diagnosis of polyostotic Paget's disease of bone was made, and supplementation with calcium and a single dose infusion of 5 mg zoledronic acid was indicated. After eight months, the patient returned without new complaints and with total improvement of previous painful symptoms. Additionally, alkaline phosphatase was 198 U/L, consistent with a good laboratory response.

DISCUSSION

Paget's disease of bone (PDB) was first described in 1877 by Sir James Paget. PDB is characterized by an increase in the activity of bone cells, leading to abnormal bone growth with sclerotic and lytic areas. The process begins with excessive resorption by abnormal osteoclasts, followed by disorganized bone formation by osteoblasts. This condition is the second most common osteometabolic disorder, after osteoporosis, yet still greatly underdiagnosed and undertreated[2,7].

PDB can affect a single bone (monostotic form) or multiple bones (polyostotic form). It is more prevalent among the elderly and slightly more common in men than in women, varying considerably by geographic region, with a higher incidence in populations of British descent, such as the United Kingdom, and rare in individuals under 50 years old[1,2]. The reported case is of a patient with an atypical presentation, characterized by symptom onset and diagnosis before the expected age range, already in the symptomatic phase of the disease and presenting considerable bone deformities.

The most affected sites include the pelvis, vertebrae, and femur, consistent with what was described in the case above, and can lead to complications such as bone pain and deformity, fractures, deafness, osteoarthritis, and osteosarcoma[5].

Genetic factors play an important role in the pathogenesis, as relatives of patients with the disease have an increased risk of developing it[1,3]. In Brazil, the highest rates of occurrence are in the Northeastern states, due to European colonization in the region[10].

The pathogenesis of PDB involves a loss of normal regulation of bone resorption and formation, occurring in three phases: a lytic phase, a mixed phase of lytic and blastic activity, and a sclerotic phase. Mutations in the SQSTM1 gene are common in cases with a positive family history[2]. This gene encodes the p62 protein involved in the NF-κB signaling pathway.

Mutations in SQSTM1 have been identified in patients with PDB, impairing the ability of p62 to bind to ubiquitin, leading to an increase in osteoclast activity[3]. Additionally, environmental factors, including viral infections, also appear to contribute to its pathophysiology[1-3].

The clinical presentation of PDB can vary from asymptomatic patients to bone pain, deformities, fractures, neurological complications such as nerve compression, and hearing loss. Osteoarthritis can also be associated with this condition[2,6,7]. The symptoms and signs in the clinical case were typical, such as bone pain and deformity, which likely contributed to the diagnosis in a patient of divergent age from the literature.

The diagnosis of this condition usually occurs incidentally during evaluations for other health conditions and is confirmed by X-rays and bone scintigraphy. Performing bone scintigraphy with radionuclides is useful for assessing the extent of the disease and identifying possible asymptomatic sites, as in the reported clinical case where the patient had a polyostotic form but was symptomatic only in the proximal femur region. Radiographic changes reflect pathological changes over time. To assess disease activity, bone remodeling markers such as alkaline phosphatase are often used[1,3,7,8].

Bone remodeling markers are highly sensitive to detect Paget's bone changes, although they cannot completely exclude the disease in normal concentrations. These markers have shown moderate to strong correlation with scintigraphic indices before treatment with bisphosphonates. The marker P1NP shows higher correlation with disease activity, being an attractive option for monitoring treatment response. However, the limited availability and high cost of this marker seem to limit its use. Therefore, the measurement of total alkaline phosphatase is considered a useful marker for assessing disease activity after treatment, considering its availability and moderate correlation with bone scintigraphy data[1].

Despite remodeling markers being widely recommended for therapeutic monitoring, we should also value aspects related to the quality of life of patients. Although generally considered a benign disease, some individuals may present significantly severe complications. This justifies the need for more effective methods of early detection of the disease before irreversible bone damage occurs[4].

Non-surgical treatment involves lifestyle modifications, physiotherapy, and medications. Surgical modalities are used in refractory cases for corrections of deformities or complications of the disease[6,9].

Regarding drug treatment, attention should be paid to controlling painful symptoms using analgesics, nonsteroidal anti-inflammatory drugs, and antineuropathic agents, in addition to specific anti-Paget's treatment involving the use of osteoclast inhibitors to reduce bone remodeling. Bisphosphonates are considered the treatment of choice for PDB[3,5,8]. Long-term results of treatment with bisphosphonates, particularly zoledronic acid, show lasting suppression of bone remodeling and improvement in quality of life[2,8]. Zoledronic acid rapidly normalizes biochemical markers of PDB. Furthermore, this medication is highly safe for use in patients with PDB, with adverse events being rare, particularly when compared to osteoporosis[3]. As therapeutic alternatives, denosumab and salmon calcitonin are available, although

there is less evidence regarding the efficacy of these medications[2,3].

The patient reported in the case was treated with a single dose of 5 mg intravenous zoledronic acid, along with calcium supplementation, showing clinically significant improvement with resolution of painful symptoms. Additionally, there was a significant decrease in total alkaline phosphatase levels, consistent with a satisfactory laboratory response. These results are in line with current literature, which highlights the importance of bisphosphonates in the treatment of PDB.

CONCLUSION

Patients are advised to seek early medical help when experiencing symptoms. For healthcare professionals, it is important to recognize classical symptoms even in patients younger than those mentioned in current literature, as well as the efficacy of zoledronic acid in controlling symptoms and rapidly normalizing disease activity biomarkers.

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SCIENTIFIC ARTICLE - REVIEW ARTICLE

ANESTHESIA AND ARTIFICIAL INTELLIGENCE: WHERE ARE WE AND WHERE ARE WE GOING?

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ABSTRACT

Technology based on Artificial Intelligence (AI) and its subfields such as Machine Learning and Deep Learning applied to the healthcare sector is undergoing rapid evolution. In the field of anesthesiology, its applications can be observed in the areas of preoperative assessment, monitoring of anesthetic depth, automated drug administration, ultrasound-guided regional anesthesia, and surgical room management with promising results.

Objective: The objective of this narrative literature review is to understand the technological landscape in which anesthesiology currently exists and explore future perspectives. It aims to comprehend the results, barriers, and challenges within this field.

Methodology: This study consists of a literature review, conducted through the analysis of articles on the PubMed platform from the years 2010 to 2023, using the terms: Anesthesiology, Artificial Intelligence, Machine Learning, and Deep Learning. Results:

Results: 65 articles related to the searched terms were identified, of which 25 articles were selected. After excluding 3 articles unrelated to the theme, 22 articles were deemed eligible, and 15 articles were chosen for the present study.

Conclusion: Artificial Intelligence and its subfields are undergoing progressive development and expansion. The ability to create algorithms that perform tasks and solve problems similarly to human intelligence is present in various areas of anesthesiology. They assist experts in delivering quality, safety, and efficiency in care; however, ethical, moral, and social barriers must be overcome. Despite showing promising results, future studies regarding their applicability should be conducted, and the presence of the anesthesiologist is still indispensable in clinical practice.

Keywords: Anesthesiology; Artificial Intelligence; Machine Learning; Deep Learning.

INTRODUCTION

Artificial intelligence (AI) represents a dynamic area of computer science that seeks to empower machines to perform tasks that are executed based on human action and intelligence. At the heart of AI is the idea of developing algorithms and systems capable of learning, reasoning, and making decisions autonomously, potentially imitating, matching, or even surpassing the performance of experts in various fields [1-4].

Machine Learning (ML) is a subfield of AI that enables computers to make decisions and solve problems, improving future actions without explicit programming. Algorithms are formed by analyzing data that can include numbers, text, images, sounds, and speech [2-4].

Deep Learning (DL) is a subfield of ML that relies on complex computational architectures called artificial neural networks (ANNs) that mimic the human brain. It aims to create models capable of learning and performing complex tasks without prior programming by analyzing data, enabling them to achieve the best answer or result for a given task [4].

In the field of anesthesiology, AI shows positive trends, being present in various sectors of the field, with its main clinical applications currently in: 1- Preoperative evaluation; 2- Monitoring of anesthetic depth and automated drug administration; 3- Ultrasound-guided regional anesthesia (USGRA); 4- Operating room management and logistics [1-4].

The present study aims to discuss the existing forms of AI that currently assist anesthesiologists, investigate potential advances in the field, and relate the benefits achieved in patient care outcomes.

METHODOLOGY

This study consists of a narrative review of the literature, conducted through the analysis of articles searched on the PubMed platform, between the years 2010 and 2023, applying the following keywords in its selections: Anesthesiology, Artificial Intelligence (AI), Machine Learning, Deep Learning.

The inclusion criteria were articles presenting previous studies related to the fields of anesthesiology and AI algorithms currently validated in clinical practice.

Articles with the terms ML and DL related to the development of algorithms applied to anesthesiology were also included, although the details of their development by the field of Computer Science were not described in detail here.

RESULTS

Figure 01 shows the flowchart for the selection of studies included in this review. The search resulted in 65 articles. After critical reading, 25 were selected for addressing the relationship of the topic with anesthesiology. Three articles were excluded for being off-topic. Of the total, 22 were evaluated for eligibility, and 10 articles contained similar descriptions with redundancy in how the topic was described in its context. Therefore, 16 articles were included for the present study. Table 01 describes the authors of the various studies, objectives, and conclusions discussing the analyzed topic, presented in a summarized manner.

AI is present in various fields of anesthesiology, with validated applicability in preoperative evaluation, blood pressure monitoring, automated drug administration, ultrasound-guided regional anesthesia, and surgical room management.

Figure 1. Flowchart for selection and inclusion of articles in the present study.

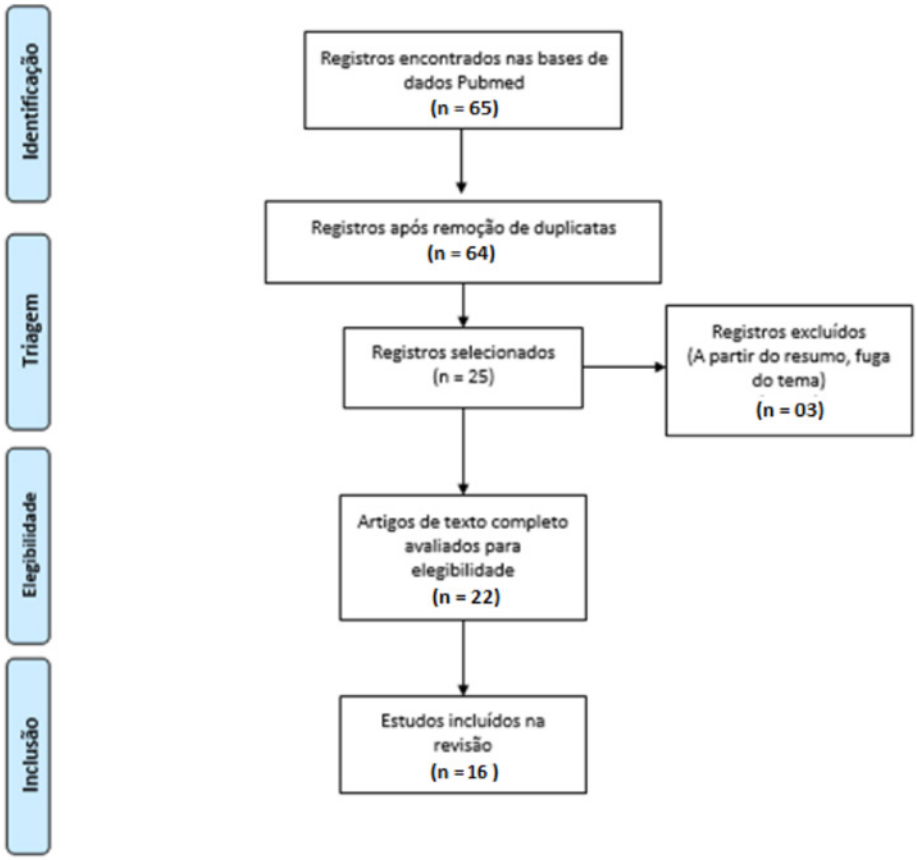

Table 1 - Results of the literature search, presented in summary form, including articles, authors, objectives, and conclusions.

ARTIGO	*AUTOR*	OBJETIVO	CONCLUSÃO
1- Necessity and Importance of Developing AI in Anesthesia from the Perspective of Clinical Safety and Information Security	*Song .B. et al*	Esclarecer a situação atual e os desafios da aplicação de IA em anestesiologia, fornecendo referências clínicas e orientando o desenvolvimento futuro da IA na área.	Os algoritmos de IA são ferramentas clínicas que analisam com rapidez e precisão grandes quantidades de dados, descobrindo correlações e padrões imperceptíveis para a cognição humana. Anestesistas auxiliam a identificar possibilidade de novas tecnologias e fornecer *insigths* que garantem suas aplicabilidades na área.
2- A Comprehensive Analysis and Review of Artificial Intelligence in Anaesthesia.	*Singal M. et al*	Explorar o uso, os desafios e as aplicações prospectivas de IA na anestesiologia.	IA pode melhorar os cuidados de saúde, aprimorar produtividade e treinar futuros anestesiologistas. Tem aplicações na monitorização de sinais vitais, predição de eventos adversos e administração automatizada de drogas. Apresenta como desafios a qualidade e quantidade dos dados analisados, limitações técnicas e problemas éticos e morais.

ARTIGO	*AUTOR*	OBJETIVO	CONCLUSÃO
3- Artificial Intelligence in Anesthesiology: Current Techniques, Clinical Applications, and Limitations	*Hashimoto D. et al*	Revisar sobre a implicação da IA na anestesia, discutir sobre suas limitações e sobre o papel dos médicos no desenvolvimento de novas tecnologias.	IA pode impactar a prática anestésica dando suporte perioperatório, nos cuidados críticos e no manejo da dor ambulatorial. Com o avanço tecnológico é de grande importância que os anestesiologistas fornecem insights baseados na prática clínica para verificar a aplicabilidades de futuras tecnologias de IA.
4- Anesthesia Monitoring using Artificial Intelligence Techniques	*Grath H. et al*	Demonstrar as evoluções tecnológicas que atuam na área da anestesiologia.	O avanço da tecnologia permitiu criar robôs com sistemas farmacológicos capazes de titular as doses e manter o estado de analgesia, hipnose e relaxamento neuromuscular. Em anestesia demonstram a vantagem de eliminar a parte repetitiva de "*workload*" permitindo aos anestesistas focarem mais no cuidado do paciente.
5- Artificial intelligence and telemedicine in anesthesia: potential and problems	*Bellini V. et al*	Discutir sobre a atual aplicação de telemedicina na anestesia e cuidados perioperatórios.	IA tem benefícios nas fases do cuidado perioperatório, previsão de riscos e organização das salas operatórias. Reduz custos e melhora os resultados da assistência. Telemedicina tem sucesso na avaliação pré-operatória, monitoramento dos cuidados e acompanhamento pós cirúrgico.
6- Preadmission Anesthesia Consultation Using Telemedicine Technology: A Pilot Study	*Wong D. et al*	Relatar sobre os aspectos e implementação da telemedicina em consultas anestésicas.	Telemedicina pode reduzir os custos com deslocamento dos pacientes e melhorar a acessibilidade do cuidado à saúde.
7- Patient preferences on telemedicine for preanesthesia evaluation	*Fishman M. et al*	Investigar a preferência dos pacientes quanto ao uso da telemedicina para avaliação pré anestésica	Telemedicina permite realizar consultas e avaliações pré-anestésicas, alcançando satisfação do examinador e do paciente.
8- McSleepy, da Vinci, Kepler Intubation System et al	*Shah S.*	Pontuar sobre Mc Sleepy e Keppler Intubation System (KIS).	IA pode auxiliar na prática anestésica com segurança e precisão.
9- Recent advances in the technology of anesthesia	*Seger C. et al*	Dicorrer sobre a presença da tecnologia na prática anestésica.	A tecnologia de monitorização e entrega de medicamentos permitiu segurança e eficiência dos anestésicos. A telemedicina permite avaliações perioperatórias e a geração de dados de saúde. Automação é iminente no futuro da anestesiologia. As inovações precisarão considerar os fatores humanos, garantir a privacidade, segurança, e validade dos dados gerados.
10- Artificial intelligence, nano-technology and genomic medicine: The future of anaesthesia	*Naaz S. et al*	Concentrar nas associações e oportunidades de IA criadas com anestesia.	IA poderia ser usada para desenvolver ferramentas avançadas de apoio à decisão clínica aumentando a precisão e eficiência da prática anestésica. A anestesia é uma especialidade complexa sendo irrealista a hipótese de substituição por IA.
11- Monitoring the depth of anesthesia using entropy features and an artificial neural network	*Shalbaf R.et al*	Propor um novo modelo automatizado de avaliação de profundidade anestésica.	Um novo modelo de sistema de monitorização de EEC poderia auxiliar anestesistas a estimar a profundidade anestésica com rapidez e precisão.

12- Artificial intelligence in ultrasound-guided regional anesthesia: A scoping review	*Viderman D. et al*	Revisar as aplicações de IA no uso de USG em anestesia regional.	IA pode ser útil para identificar estruturas anatômicas durante anestesia guiada por USG reduzindo ou evitando complicações.
13- The Advances and Utility of Artificial Intelligence and Robotics in Regional Anesthesia: An Overview of Recent Developments	*Karmakar A. et al*	Explorar o cenário e aplicações de IA e robótica na anestesia regional, delineando benefícios, desafios e considerações éticas.	IA e a robótica têm o potencial de remodelar a prática da anestesia regional, melhorando o atendimento ao paciente e o manejo da dor.
14- Machine learning approach to needle insertion site identification for spinal anesthesia in obese patients	*Chan J. et al*	Discorrer sobre o uso de USG em anestesia de neuroeixo.	O uso de USG em anestesia de neuroeixo identifica o local de punção em pacientes obesos reduzindo o desconforto e complicações.
15- Ultrasound Images Guided under Deep Learning in the Anesthesia Effect of the Regional Nerve Block on Scapular Fracture Surgery	*Liu Y. et al*	Avaliar os desfechos de bloqueios guiados por USG em fratura escapular.	O USG apresenta precisão para identificar estruturas resultando em efeitos anestésicos adequados com baixas complicações. Modelos de DL podem melhorar efetivamente a conduta em pacientes com fratura de escapula.
16- Artificial Intelligence: A New Tool in Operating Room Management	*Bellini V. et al*	Entender o papel das novas tecnologias no período perioperatório, com foco particular em manejo e gestão de salas operatórias.	ML é capaz de dar suporte a modelos que coordenam múltiplos espaços simultaneamente como SRPA e salas cirúrgicas. Podem limitar problemas organizacionais com importante repercussão econômica. Tem potencial na gestão de centros cirúrgicos, capacidade de melhorar os serviços hospitalar, avaliar os riscos perioperatórios e atentar às necessidades da recuperação de cada paciente.

Below, still as results, we developed four sub-themes according to the scope of the study: Application of artificial intelligence in preoperative medicine; Application of artificial intelligence in monitoring anesthetic depth and automated drug administration; Application of artificial intelligence in regional anesthesia; and Application of artificial intelligence in operating room management.

APPLICATION OF ARTIFICIAL INTELLIGENCE IN PREOPERATIVE MEDICINE.

Perioperative assessment allows the anesthesiologist to examine the patient and identify risk factors, enabling adequate anesthetic and operative planning, reducing complications, and mortality [5].

Defined by the World Health Organization (WHO) as the provision of health services through communication technologies, telemedicine allows anesthesiologists to conduct consultations, pre-anesthetic evaluations, and patient follow-up in regions where distance is a limiting factor [5-7].

Wong (2004) demonstrated the success of telemedicine during pre-anesthetic assessment, making it possible to achieve patient satisfaction and identify clinical conditions that could postpone the surgical procedure [6].

Computerized evaluation of photographs and facial analysis help identify predictive indicators of difficult airway (DA), and algorithms that use measures such as body mass index (BMI) and mento-thyroid distance allow anesthesiologists to decide on the best strategy for orotracheal intubation (OTI) [7].

ML models identify high-risk patients based on data analysis such as vital signs, ASA physical status classification, and comorbidities. These data are correlated, and the algorithms are programmed to predict possible postoperative outcomes such as severe operative pain and the need for ICU admission, assisting in proper bed management, shortening hospital stay, and reducing costs [5-7].

According to Fishman (2014) and Song (2022), AI has shown positive results. Advanced technology such as airway cameras and electronic stethoscopes assists in pre-anesthetic assessment; however, the doctor-patient relationship and the specialist's intuition in decision-making should be preserved.

APPLICATION OF ARTIFICIAL INTELLIGENCE IN ANESTHETIC DEPTH MONITORING AND AUTOMATED DRUG ADMINISTRATION

Anesthetic depth (AD) corresponds to the central nervous system response between the period of the effect of anesthetic drugs and the nociceptive perception of surgical stimuli.

The excessive use of hypnotics is correlated with increased postoperative mortality, and superficial anesthesia is related to emotional trauma and physiological changes that can compromise the surgical procedure and the postoperative outcome. Adequate monitoring of AD allows for safe surgical procedures, reduced doses of hypnotics, and favorable post-anesthetic recovery. Currently, the bispectral index (BIS) is the most used monitor, but interference in the capture of electroencephalographic signals and the poor nociception relationship predispose to subjective assessments of AD.

The electroencephalogram (EEG) records the brain's electrical activity and provides information about the different physiological states of the brain. Models based on ANNs identify the different characteristics of the waves captured and correlate them with the depth of anesthesia.

Mathematical models constructed from data analysis and deep learning determine the dose-response relationship of an anesthetic based on its pharmacokinetic and pharmacodynamic characteristics. Using monitoring data such as heart rate, blood pressure, and BIS, algorithms prevent fluctuations in AD by controlling and adjusting the target dose of hypnotics. [10-11].

Automation is the ability of a machine to change its function without human intervention, but in pursuit of a goal defined by it. The interdependence of these factors defines closed-loop anesthesia delivery systems (CLADS) [11].

The McSleepy, developed by McGill University Health, is an example of automation in anesthesia administration. Designed to monitor and maintain anesthetic depth, it uses parameters such as blood pressure, pain, and muscle relaxation to calculate the appropriate dose of anesthetics. It acts as a humanoid anesthesiologist capable of analyzing information and adapting its behavior, monitoring and recognizing malfunction [8].

Another example where AI was present in anesthesiology was in April 2011, when the Kepler Intubation System (KIS), a robotic intubation system developed by Dr. Thomas M. Hemmerling, performed the first remote intubation on a patient at the Montreal General Hospital. The KIS was developed with the goal of facilitating the intubation procedure, reducing complications associated with airway management [8].

Monitoring blood pressure using machine learning models that analyze EEG wave characteristics has allowed for a more precise evaluation of the anesthetic state compared to BIS [11].

The integration of AI and BP monitoring contributes to safer, personalized, and more effective anesthesia. Brain electrical activity, heart rate, blood pressure, and oxygen saturation make up the data

analyzed by the algorithm, allowing for real-time blood pressure assessment, reducing complications, and optimizing the doses of hypnotics used.

APPLICATION OF ARTIFICIAL INTELLIGENCE IN REGIONAL ANESTHESIA

Visual Computing is a subfield of AI in which machines recognize images, videos, and other visual data such as tomographies and x-rays. It has great applicability in anesthesiology with the automated analysis of ultrasound images that assist in the identification of structures during sonographically guided peripheral nerve blocks [12-13].

Ultrasound (USG) is commonly used in anesthesiology to perform regional blocks. Capable of identifying structures such as blood vessels, muscles, bones, and nerves, it allows for real-time monitoring of needle insertion and local anesthetic dispersion, minimizing or avoiding puncture accidents. Experts in the learning curve, overweight patients, and overlapping images with similar echogenicity are challenges that increase the risk of complications such as intravascular injections, nerve injury, and pleural or peritoneal puncture [12].

Hashimoto (2020) and Viderman (2022) demonstrated the applicability of artificial neural networks to identify anatomical structures from ultrasound images, successfully assisting in anesthetic practices [3,12].

The use of USG with automatic target detection assists anesthesiologists in identifying specific anatomical structures and ensuring the correct positioning of the needle and administration of local anesthetic, reducing complications and increasing the success of the anesthetic technique [12,14].

Chan (2021) presented, after evaluating 48 patients, that machine learning algorithms and image processing help identify the best needle insertion site and angle in neuroaxis blocks in obese patients with a body mass index (BMI) > 30 kg/m², reducing discomfort and complications from multiple punctures [14].

Liu (2021) concluded that the use of deep learning in ultrasound images assists in the regional blockade of patients undergoing scapular fracture surgery, reducing complications and the execution time of the blockade [15].

Despite being a promising technique, the applicability of AI in regional anesthesia presents risks and limitations. Failure to identify nerves with densities similar to nearby structures or failure to recognize structures with anatomical alterations predisposes to puncture trauma or systemic toxicity due to intravascular administration of local anesthetic. The identification of richly vascularized structures is also a challenge [13-14].

APPLICATION OF ARTIFICIAL INTELLIGENCE IN OPERATING ROOM MANAGEMENT

Surgical centers can be considered the "financial center" of hospital units, representing approximately 30 to 45% of revenue. They present a complex space where the high expectations of patients are confronted with the interaction of various professionals and unpredictable surgical schedules [4].

With the ability to generate numerous data points such as the type of surgery, surgical team, patient's medical history, as well as the type of anesthesia and surgical team experience, machine learning algorithms and artificial neural networks are fed, creating surgical center management systems [4,16].

This way, AI can optimize costs and reduce expenses by predicting the occupancy time of operating rooms and the stay in the Post-Anesthesia Care Unit (PACU), increasing the efficiency and safety of the service [16].

DISCUSSION

AI has the ability to quickly and accurately analyze large data sets and identify patterns that are imperceptible to human cognition, making it a greatly helpful tool. However, it should be implemented in the right situation to address a specific question or solve an applicable problem.

With various applications in the field of anesthesiology, AI presents promising results, especially in the areas of preoperative assessment, monitoring of anesthetic depth, automated drug administration, regional anesthesia, and operating room management.

In preoperative assessment, the advent of telemedicine has enabled remote anesthetic consultations. With the aid of algorithms for facial recognition and analysis of data such as vital signs, comorbidities, BMI, and ASA physical status, it has been possible to assess and monitor patients in remote areas. Thus, AI has contributed to the success of assessments, stratifying surgical risks, VAD, and minimizing possible complications. However, due to cultural aspects, medical-patient contact is still necessary to achieve complete patient satisfaction.

ANNs identify different EEG wave patterns and correlate them with data obtained from blood pressure monitors, heart rate, and muscle relaxation, determining the brain's physiological state and predicting the level of blood pressure. Together with mathematical models built from the pharmacokinetic and pharmacodynamic characteristics of drugs, they determine the dose-effect relationship of anesthetics, preventing excessive blood pressure or superficial consciousness, ensuring safety during the surgical procedure, better anesthetic recovery, and cost reduction.

However, due to the human ability to extrapolate the known and deal with unexpected and emergent situations, the clinical judgment of the anesthesiologist is essential during patient care. The specialist is indispensable for evaluating the usefulness and validity of the data collected for algorithm training and ensuring that the developed technology is clinically applicable [3].

Visual computing recognizes patterns of anatomical structures that, in association with ML-based algorithms, compose software currently used in ultrasound devices, assisting anesthesiologists during sonographically guided regional and neuraxial blocks. With the assistance of AI, the risks of nerve injury, technique failure, puncture of nearby structures, and local anesthetic intoxication administered in the intravascular space are significantly reduced. Despite its success, this technology needs to improve the quality and quantity of images analyzed in its database, as structures with similar densities and anatomical changes can compromise the reliability of its use.

Surgical centers have significant economic importance within hospital institutions. Operating room occupancy, length of stay in the Post-Anesthesia Care Unit (PACU), inconsistency in surgical schedules, procedure complexity, and team experience are data directly related to productivity and efficiency. This information feeds AI algorithms that allow predicting the occupancy time of operating rooms and PACU, increasing efficiency, and reducing costs in these units.

While AI is a promising technology for the healthcare system, it is not exempt from challenges to be overcome, such as ethical and moral issues, quality and quantity of recorded data, and technical limitations. Future qualitative research will be necessary to better understand the ethical, social, and cultural implications of the integration between AI and clinical care.

Although effective in demonstrating correlations and identifying patterns, AI is still unable to determine causal relationships necessary for its clinical implementation without the participation of the anesthesiologist. Therefore, specialists in the field must critically evaluate new findings before their use.

CONCLUSION

At the end of this review, it is concluded that in the current scenario, AI can assist anesthesiologists in preoperative consultations, allowing for remote assessment and monitoring of patients. In automated drug administration and monitoring of anesthetic depth, it can evaluate consciousness accurately through the correlation between EEG waves, vital signs, and the level of muscle relaxation. In regional anesthesia, software developed with visual computing data integrates new ultrasound devices, facilitating the identification of anatomical structures and reducing technique complications. Surgical centers increase productivity and efficiency when AI algorithms assist in managing these units. The interaction between AI and anesthesiology ensures quality and safety of care, and efficiency in hospital units. The data generated in the units feed the algorithms and allow the progression of AI, however, the quality and quantity of existing data is a barrier to this, as well as ethical and sociocultural challenges. Despite its constant evolution and great applicability in the field, AI is still not able to handle complications and emergent situations, making the presence of the specialist essential in delivering care.

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Conflict of Interest

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