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OPTIMISM AND PROGRESS

The first 2025 edition of the CEREM Goiás Scientific Journal is now available, marking the beginning of another promising year for the publication of scientific work conducted by medical residents and residency programs in our region.

We express our optimism for 2025. May it be a prosperous and productive year, both for our publication and for the medical community as a whole. We hope to continue making a significant contribution to the dissemination of studies and practices that positively impact public health and well-being.

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SCIENTIFIC ARTICLE - CASE REPORT

ANESTHETIC APPROACH TO VIDEOLAPASCOPIC SURGERY IN PATIENTS WITH MYASTHENIA GRAVIS: A CASE REPORT

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ABSTRACT

Myasthenia gravis (MG) is an autoimmune disease characterized by fatigue and weakness of skeletal muscles, that improve after rest. Its main clinical manifestations are localized weakness of the ocular muscles (diplopia and ptosis), dysarthria and dysphagia. Thus, it is a disease of great interest to the anesthesiologist, as it specifically compromises the neuromuscular system. This article seeks to report a case of a 32-year-old female patient undergoing emergency videolaparoscopy using total intravenous general anesthesia, using rocuronium for neuromuscular blockade, followed by complete reversal.

Keywords: Anesthesia general, Anesthesia intravenous, Myasthenia gravis, Laparoscopy, Autoimmune disease.

INTRODUCTION

Myasthenia Gravis (MG) is an autoimmune disease characterized by fatigue and weakness of the skeletal muscles, with improvement after rest. It primarily affects women in their third and fourth decades of life and older adults between 60 and 80 years of age. [1]

Approximately 80 to 85% of patients with MG have antibodies against nicotinic acetylcholine receptors (AChR) at the motor endplate. This leads to a reduction in the number of these postsynaptic acetylcholine receptors at the neuromuscular junction, which decreases the ability of the neuromuscular terminal plate to transmit the nerve signal. The remaining 20% show negative serology for AChRs. [2]

The production of anti-AChR antibodies is directly dependent on T cells, with CD4+ T cells stimulating B cells to produce autoantibodies—a process that occurs primarily in an intrathymic environment. Notably, most patients with MG present with thymic abnormalities, with more than 50% of anti-AChR-positive cases exhibiting thymic hyperplasia and 10–15% presenting with a thymic tumor, usually a thymoma. [3] Carcinoma has also been rarely reported in association with the disease. [4]

Its main clinical manifestations include localized weakness of the ocular muscles (diplopia and ptosis), dysarthria, and dysphagia (when the bulbar muscles are affected), as well as generalized muscle weakness with possible respiratory impairment. Diagnosis is based on

clinical history, the edrophonium test, electromyography, and the detection of anti-nicotinic acetylcholine receptor antibodies. [1]

This article aims to report a case of a patient with MG who underwent emergency laparoscopic surgery under total intravenous anesthesia, using rocuronium for neuromuscular blockade (NMB), which presents a challenge for the anesthesiologist.

CASE REPORT

A 33-year-old female patient, GQS, weighing 65 kg and 1.60 m tall, with no history of smoking or alcohol use, diagnosed with MG and on pyridostigmine 180 mg/day and azathioprine 50 mg/day. She had a history of thymectomy and underwent a cesarean section four days prior. After 24 hours of the cesarean, she was discharged from the maternity ward but later developed progressively worsening abdominal pain, refractory to simple analgesics, accompanied by loss of appetite, nausea, and vomiting.

After 72 hours, she sought emergency care in general surgery due to the pain, and a CT scan of the abdomen revealed distension of the small bowel loops and colon without an obstruction factor, significant pneumoperitoneum, and slight free fluid in the cavity. Consequently, the general surgery service of the unit recommended urgent laparoscopic surgery, which revealed a perforation of the cecum, likely caused by trauma during the cesarean section procedure, requiring cecal suturing followed by abdominal cavity lavage.

According to the pre-anesthetic assessment, total intravenous general anesthesia was chosen. Induction was performed with 150 mg of propofol, 15 mcg of sufentanil, and 60 mg of rocuronium, in a rapid sequence. Direct laryngoscopy was used, with a Cormack-Lehane grade 2A airway, and orotracheal intubation was successful on the first attempt. Anesthetic maintenance was ensured with target-controlled intravenous infusion of propofol and remifentanil.

The NMB was monitored with a train-of-four (TOF) sequence. After 90 seconds, one hour, and two hours from the rocuronium induction dose, the TOF showed deep blockade, with no need for an additional dose during the intraoperative period. After 2 hours and 30 minutes of surgery, sugammadex was administered at a dose of 200 mg, resulting in complete reversal of the blockade, with neuromuscular function restored, as indicated by a TOF ratio greater than 0.9. The patient was conscious, with a patent airway and adequate tidal volume during spontaneous ventilation (at least 5 ml/kg, with more than 14 respiratory cycles per minute). Thus, the patient was extubated and transferred to the Intensive Care Unit (ICU) without motor deficits.

In the ICU, the patient started antibiotic therapy with meropenem and vancomycin for sepsis from an abdominal focus. The total length of hospital stay from admission was 10 days, with discharge to home after completing the intravenous antibiotic therapy cycle.

DISCUSSION

The choice of anesthetic technique in patients with MG is challenging. One must consider the pathophysiology of the disease and its effect on the functioning of the motor endplate, as well as the potential interactions of various anesthetic agents on muscle function. Additionally, the treatment of MG with anticholinesterase medications may influence anesthetic management.[1]

In this regard, monitoring neuromuscular function with the train-of-four (TOF) sequence should be routine in patients with MG, and it should be initiated immediately after anesthetic

induction, as established in the monitoring of the patient in this case report. [1]

In the selection of intravenous drugs for induction and maintenance of anesthesia, propofol appears to be a better option, as it does not seem to alter neuromuscular function. Additionally, its pharmacokinetic and pharmacodynamic profile allows for rapid recovery of consciousness, airway reflexes, and return to spontaneous ventilation. [5]

Regarding the choice of opioids, those with potential for accumulation, such as fentanyl, should be avoided. Thus, remifentanil presents a suitable pharmacological profile for perioperative analgesia, with a predictable distribution model in a single compartment. [1]

As the myasthenic patient has a decreased number of cholinergic receptors, they may exhibit an abnormal response to NMB. Thus, there is increased resistance to depolarizing NMBs, such as succinylcholine, and greater sensitivity to non-depolarizing NMBs. [5]

Additionally, the use of NMBs in patients with MG has been associated with a higher rate of unsuccessful extubation and longer postoperative mechanical ventilation time. In this regard, when the use of these agents is necessary, it is recommended to choose those with a short to intermediate duration, such as atracurium, cisatracurium, and rocuronium, at a lower dose. [5]

The choice of rocuronium in the case described here was also due to the fact that this agent can be neutralized by sugammadex, a chemically modified gamma-cyclodextrin capable of encapsulating depolarizing agents, such as rocuronium. The safety and effectiveness of sugammadex in patients with MG have been demonstrated by several authors. [6]

The use of halogenated agents, such as sevoflurane, isoflurane, desflurane, and enflurane, interferes with neuromuscular transmission and increases the effects of non-depolarizing muscle relaxants. Thus, total intravenous anesthesia was chosen in the described case to avoid enhancing the effect of the neuromuscular blocker used in anesthetic induction. [1]

CONCLUSION

The anesthetic technique used, along with the choices of anesthetic agents and NMB, were effective for the patient described above. The preference for anesthetics that do not act on the motor endplate and have predictable distribution pharmacology, as well as a muscle relaxant that has a specific reversal agent, contribute to the success of the approach.

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SCIENTIFIC ARTICLE - CASE REPORT

PLACENTA ACCRETA: CESAREAN SECTION – HYSTERECTOMY A CASE SERIES

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ABSTRACT

Introduction: Acretism is the implantation of the abnormal placenta in the uterine wall, it is classified according to the degree of depth. The incidence of accretion increased worldwide in parallel with the increase in cesarean sections, with 1 case for every 533 births. **Objective:** To evaluate cesarean surgery / hysterectomy (placenta in loco) as a healthy maternal-fetal binomial resolution. **Method:** case series. **Discussion:** The best therapeutic proposal in cases of accretism is the planning of cesarean delivery followed by total abdominal hysterectomy (HTA). Conservative treatment (maintenance of the uterus leaving the placenta in situ) due to the associated high morbidity and mortality should be considered exceptionally. The patient profiles of the cases fit the risk factors mentioned in the studies. All cases had a previous cesarean section and diagnosis of placenta previa; average age: 36.8 years (32-41 years); average parity (gestation): 2.8 (G4-G2). Case 2 was scheduled for cesarean delivery and hypertension. However, during cesarean section, the uterus was preserved and evolved to hemorrhagic shock 4 hours after the end of the procedure, requiring HTA in the 2nd period. In cases 1, 3 and 4, cesarean delivery and hypertension were planned without complications. In all cases, the final treatment evolved with hysterectomy, meeting the literature as the best therapy. **Final considerations:** Good conduct in the face of accretism with prior diagnosis through USG and Doppler, delivery planning in a referral center (reserve of hemoconcentrates and ICU) with an experienced and multidisciplinary team has the power to change the prognosis.

Keywords: Placental accretism, Cesarean section, Hysterectomy, Risk factors, Case series.

INTRODUCTION

Placenta accreta is defined as an abnormal implantation into the uterine wall, extending beyond the endometrium and invading the myometrium, potentially reaching the serosa or even infiltrating adjacent organs.[1,2]

Normally, the chorionic villi penetrate the compact and superficial portion of the decidua and do not reach the spongy layer. This allows for placental separation during detachment. Endometrial and myometrial damage are responsible for the abnormal implantation of the placenta, with a thin

or absent basal decidua (spongy layer) and imperfect development of the fibrinoid layer (Nitabuch's layer).[1,3] Penetration into the spongy layer and myometrium prevents decidual shedding and is characteristic of placental accreta.[1,4]

The ACOG (American College of Obstetricians and Gynecologists) reported in 2012 that the incidence of accreta has increased worldwide in parallel with the rise in cesarean sections, occurring in 1 case for every 533 births (Committee on Obstetric Practice, 2012).[5] In 1950, the occurrence was much rarer, at 1 in every 30,000 births.[6,7]

Placenta accreta has a high mortality rate of 6 to 7%, with the main complication being hemorrhagic shock, which can worsen the clinical condition, evolving into disseminated intravascular coagulation (DIC), adult respiratory distress syndrome (ARDS), renal failure, and even maternal-fetal death.[5,8,9]

Early diagnosis is crucial in this pathology. Pregnant women with a history of previous cesarean section, placenta previa, multiparity, maternal age over 35 years, and endometrial defects have an increased risk of accreta.[1,5] Therefore, ultrasound (US) should be requested to evaluate the placenta, as it is an excellent diagnostic method. When ultrasound is inconclusive, magnetic resonance imaging (MRI) may be requested.[5]

The incidence of placenta accreta is on the rise, and planning for delivery with cesarean section and abdominal hysterectomy (AH) through prior diagnosis has the potential to change the prognosis of this condition.

Therefore, the objective of this work is, through a case series, to evaluate the surgical intervention of cesarean section/hysterectomy (placenta in situ) as a healthy resolution for the maternal-fetal binomial.

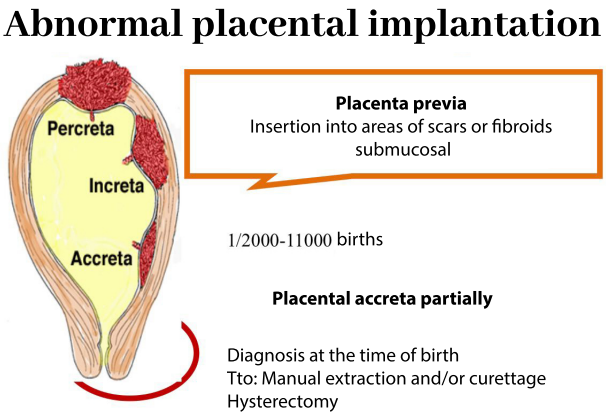

Figure 1: Placental accreta and its types.

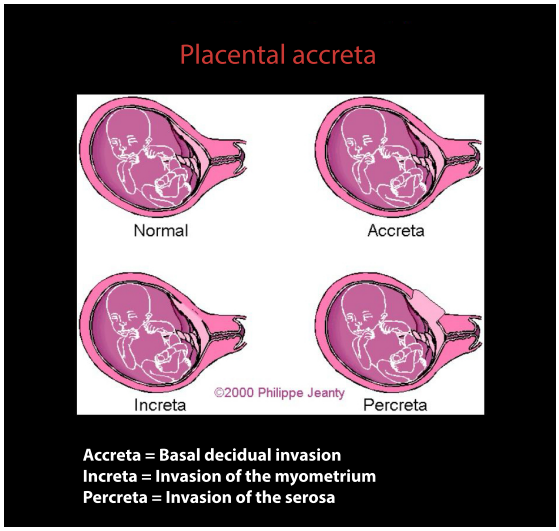

Figure 2 – Placental accreta associated with placenta previa.

THEORETICAL FRAMEWORK

In placenta accreta, implantation occurs abnormally in the uterine wall and is classified according to the depth of penetration as follows[2]:

Placenta accreta: adheres to the myometrium[5].

Placenta increta: invades the myometrium.

Placenta percreta: penetrates the myometrium, reaching the serosa, and may occasionally invade adjacent organs such as the bladder, ureter, intestine, and omentum[5].

Histological studies of placentas with accreta showed a diagnosis of accreta, increta, and percreta in 79%, 14%, and 7%, respectively.[1,6,10]

Previous cesarean section is considered the most important predisposing factor for placenta accreta, with studies concluding that the higher the number of surgeries, the greater the risk.[6,11-14] Other risk factors include placenta previa, maternal age over 35 years, multiparity, endometrial defects (Asherman's syndrome), and submucosal leiomyomas.[1,6]

Prenatal diagnosis is important for birth planning. In the presence of placenta previa and a previous cesarean section, it is crucial to request an ultrasound with an experienced team for the diagnostic screening of placental accreta.[5] When ultrasound is inconclusive and in cases of placenta previa with posterior predominance, magnetic resonance imaging (MRI) should be requested.[5]

Ultrasound (US) has a sensitivity of 77% to 93% and specificity of 71% to 96%. The main signs of accreta are: loss of the hypoechoic retroplacental space, thinning of the underlying myometrium, irregularity at the interface between the uterus and bladder, protrusion of the placenta into the bladder, irregular lacunae, increased vascularization, and turbulent flow on Doppler.[5]

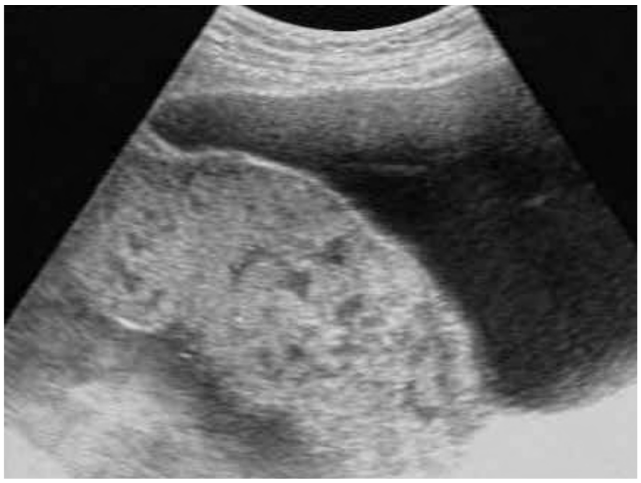

Figure 3 – Loss of the hypoechoic retroplacental space, thinning of the underlying myometrium, irregularity at the interface between the uterus and bladder, protrusion of the placenta into the bladder.

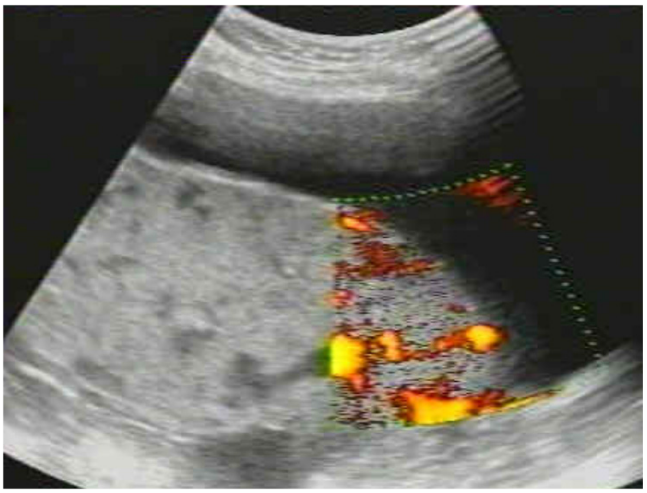

Figure 4 – Irregular lacunae, increased vascularization, and turbulent flow on Doppler.

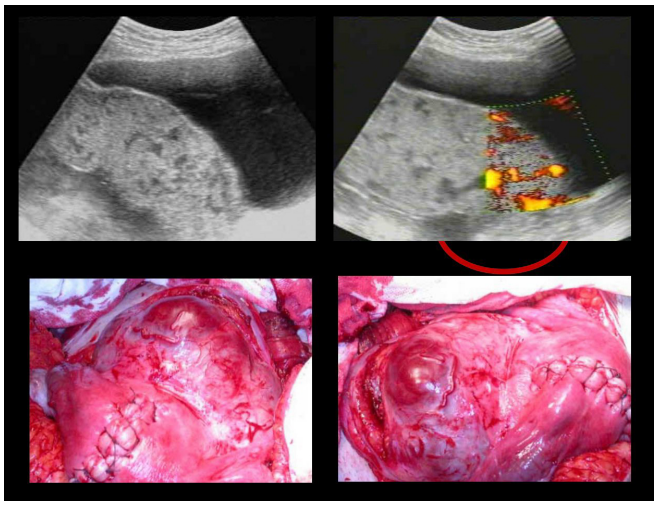

Figure 5: Upper image demonstrating placenta accreta with exuberant hypervascularization, and lower image showing the cesarean section, with evidence of the placenta reaching the serosa.

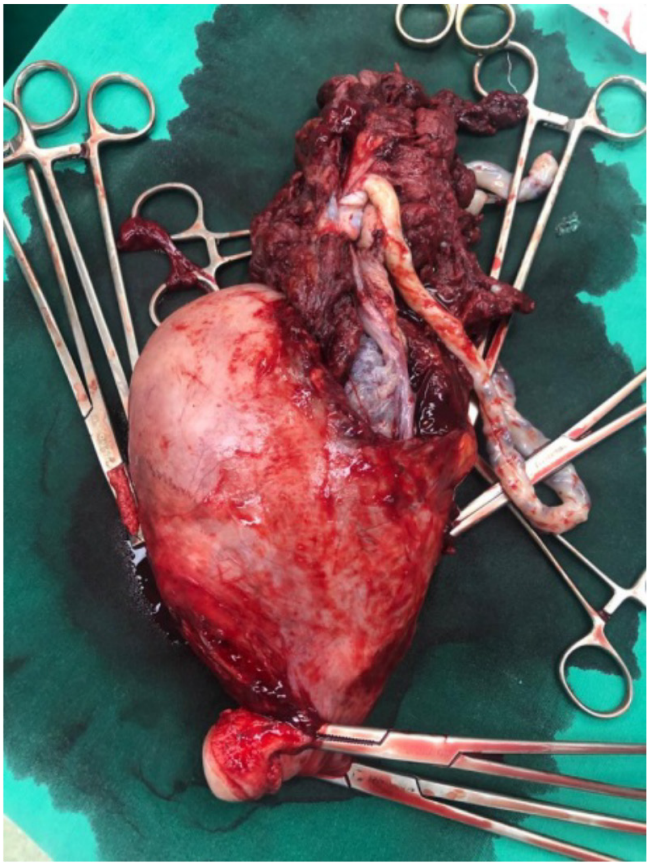

Figure 6: Illustrative image of a uterus with placenta accreta.

Magnetic resonance imaging (MRI) has a sensitivity of 80% to 88% and specificity of 65% to 100%. The main signs of placenta accreta are: placental protrusion, heterogeneous placenta, dark bands within the placenta on T2-weighted images, and focal interruption of the myometrial wall.[15,16]. MRI is useful for characterizing the type of placenta accreta (placenta accreta, increta, percreta) and determining if there has been invasion of neighboring structures.[8,9]. The use of the paramagnetic contrast gadolinium is not fully established during pregnancy, and thus, its routine use is not recommended.[5]

The main complication of placenta accreta is hemorrhage, which can lead to disseminated intravascular coagulation (DIC), adult respiratory distress syndrome (ARDS), renal failure, peripartum hysterectomy, and maternal death.[5]

There is controversy regarding the ideal gestational age for termination. It is recommended to occur between 34 and 37 weeks due to pulmonary maturation.[17]

Birth planning is of utmost importance as it improves the prognosis of the condition. Pulmonary maturation should be performed in the second trimester due to the risk of prematurity. Pregnant women and their families should be informed about the risks of accreta (risk of blood component transfusion, organ injury, infections, and death). The delivery should be planned at a reference center with a reserve of blood products and maternal and neonatal intensive care units (ICU), with an experienced and multidisciplinary team for managing this pathology.[5]

Intraoperative planning involves scheduled elective cesarean section with an experienced and focused team, anesthesia with spinal anesthesia followed by general anesthesia, bladder catheterization prior to the procedure, conventional incision (Pfannenstiel) or median incision, high corporal uterine incision (transverse or longitudinal), total hysterectomy with placenta in situ, and the patient being transferred to the postoperative period in the ICU.

There are optional procedures that can be used during the procedure, such as balloon catheterization, in which the interventional radiologist temporarily occludes the aorta or the internal iliac arteries, compression of the hypogastric arteries, ligation of the hypogastric arteries (temporary or permanent), and compression of the aorta.[15]

There is controversy regarding the effectiveness of temporary occlusion of the internal iliac arteries to reduce blood loss and surgical time (evidence level 2C). The ACOG, in 2012, stated that there is no evidence for or against temporary occlusion of the internal iliac arteries, and further studies are needed.[16,18]

Some authors recommend leaving the placenta in situ for those who wish to preserve fertility. Methotrexate in cases of in situ placenta has been evaluated in some studies, but its use is debated by various authors, as there is no trophoblast cell division in the third trimester, making it ineffective. These two approaches should be further evaluated for clinical use, due to the risks of infection, bleeding, emergency hysterectomy, and other clinical complications, as well as the risk of maternal death.[5]

OBJECTIVES

GENERAL OBJECTIVE:

Evaluate the importance of prenatal diagnosis and surgical intervention in pregnancies with placental creta)accretion.

SPECIFIC OBJECTIVE:

Considering the prenatal diagnosis of placenta accreta, evaluate the surgical intervention of cesarean section/hysterectomy (placenta in situ) as a healthy resolution for the maternal-fetal dyad.

RESULTS AND DISCUSSION

Presentation of 4 clinical cases of placental accretion in a "case series" format, where the probable diagnosis was made through obstetric ultrasound with Doppler, and the decision was made to prepare for delivery through cesarean section with hysterectomy with placenta in situ.

CASE REPORTS

CASE 1

Patient, VGS, 38 years old, G4P3A0, resident of Goiatuba, Goiás, received prenatal care in her city with a diagnosis of toxoplasmosis during pregnancy, treated with spiramycin, and denied other comorbidities or complications. Due to the toxoplasmosis diagnosis, she was referred to Goiânia where she underwent amniocentesis, ruling out vertical transmission, but discovered a central-total placenta previa with accretion. The patient did not experience any bleeding or other complications throughout the pregnancy. Therefore, an elective cesarean section with abdominal hysterectomy was scheduled at 38 weeks and 3 days, on 09/05/2020. The cesarean-hysterectomy plan included: prior preparation of blood bank,

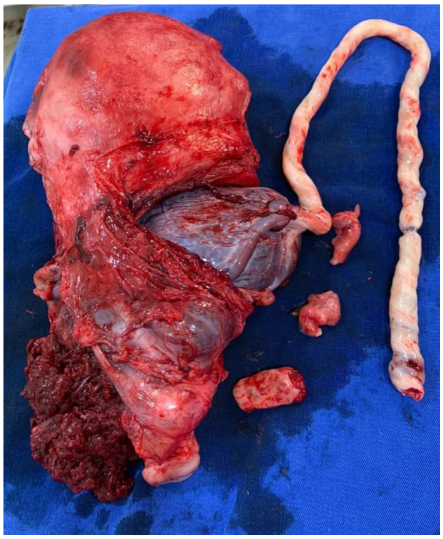

Figure 7: Image of the surgical specimen from case 1 showing the uterus with placental accretion.

CASE 2:

Patient, LOM, 41 years old, G2P1A0, resident of Goiatuba, Goiás, was receiving prenatal care in her city and was treating hypothyroidism during pregnancy with Puran 50mcg, with no other comorbidities or complications. During pregnancy monitoring, she was diagnosed at 32

weeks with posterior/central-total placenta previa with accretion and was referred to Goiânia. The patient did not experience any bleeding or other complications during the pregnancy. Therefore, an elective cesarean section with abdominal hysterectomy was scheduled for 39 weeks on 05/07/2020. However, during the operation, her husband requested that the medical team attempt to preserve the uterus. As a result, the therapeutic plan was changed, and a conservative approach was adopted, keeping the uterus with placenta in situ. Four hours after the surgery, the patient presented with hemorrhagic shock, requiring re-surgery and hysterectomy. During the surgery, the patient received the 4 units of red blood cell concentrates and 2 units of plasma as planned and was transferred to the ICU, where she stayed for 15 days. In the ICU, she required an additional 2 units of red blood cell concentrates and developed a pulmonary complication (pneumonia), necessitating intubation for 2 days. After ICU discharge, she spent 2 days in the ward before being medically discharged.

CASE 3:
Patient, NVCO, 36 years old, G3P2A0, monochorionic diamniotic twins, resident of Anápolis, Goiás, received prenatal care in her city and had gestational hypertension with preeclampsia and maternal tachycardia, being monitored by both a cardiologist and her obstetrician. At 22 weeks of pregnancy, she was diagnosed with fetofetal transfusion and central-total placenta previa with accretion, and was referred to Goiânia where she underwent fetoscopy with laser treatment and lung maturation without complications. At 25 weeks of gestation, she began experiencing persistent vaginal bleeding due to the placenta previa, and at 27 weeks and 5 days, pregnancy termination was indicated. On 09/11/2020, a cesarean section with abdominal hysterectomy was performed as planned in case 1, and 3 units of red blood cell concentrates and 2 units of plasma were transfused during the surgery. The surgery was carried out as planned, and the patient stayed in the ICU for 2 days and 5 more days in the ward before being discharged. Unfortunately, the newborns passed away due to prematurity, and the patient developed depression.

CASE 4:
Patient, TGCOL, 32 years old, G2P1A0, resident of Jataí, Goiás, received prenatal care in her city with no comorbidities or complications during pregnancy, and no history of Müllerian malformation or previous leiomyomatosis. From the beginning of her pregnancy, she was diagnosed with placenta previa, but at 30 weeks, a central-total placenta previa with accretion was identified. She began monitoring in Goiânia and underwent lung maturation. At 33 weeks and 1 day, she started experiencing vaginal bleeding, and a cesarean section with planned hysterectomy was scheduled for 10/07/2020, as mentioned in case 1. The procedure was carried out as planned, and she was transferred to the ICU afterward. She stayed in the ICU for 2 days and was discharged 1 day later in good general condition.

DISCUSSION

The obstetrician, by identifying risk factors, performing a preoperative diagnosis (ultrasound), and providing appropriate intrapartum management, can significantly improve the prognosis of placental accretion.

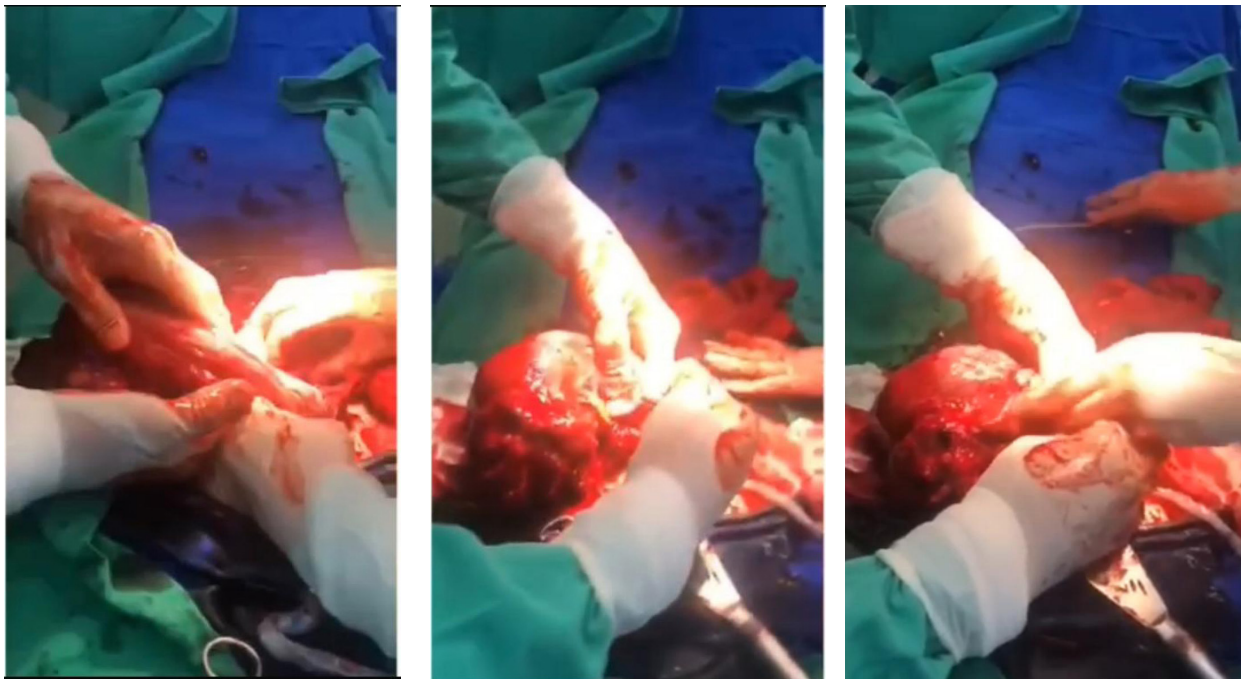

Figure 8: Cesarean section surgery with total hysterectomy due to placental accreta presenting significant hemorrhage.

The patient profiles in these cases align with the risk factors described in the literature. All cases had a history of a previous cesarean section and a diagnosis of placenta previa, with an average age of 36.8 years (32–41 years) and an average parity (gravidity) of 2.8 (G4–G2). Thus, these findings are consistent with the risk factors cited in the literature: previous cesarean section, placenta previa, multiparity, and maternal age over 35 years.

Ultrasound (USG) with Doppler facilitates visualization through the detection of turbulent flow, the disappearance of the retroplacental hypoechoic space anterior to the myometrium, and the appearance of dilated vessels within the myometrium.[9,19] USG combined with Doppler has a sensitivity of 81.1% and a specificity of 98.9%. However, when analyzing anterior and posterior placentas separately, detection rates of 89.7% and 50%, respectively, are observed.[9]

In this study, all the presented cases underwent ultrasound with Doppler, which enabled the prenatal diagnosis of placental accretion and facilitated delivery planning.

The best therapeutic approach for suspected and confirmed cases of placental accretion is the planned cesarean delivery followed by a total abdominal hysterectomy.[1,17,20]

Total abdominal hysterectomy is considered the ideal treatment for cases of placental accretion. After fetal extraction, the procedure should be performed with the placenta left in situ, as attempts at placental detachment often result in severe hemorrhage.[1]

Peripartum hysterectomy is the best option for patients who do not wish to conceive in the future.[17,20]

The physician must counsel pregnant patients and their families about the pre-, intra-, and postoperative risks, including blood transfusion, organ injury, ICU admission, infection, and

the risk of death. The procedure should be performed by a well-trained team in a specialized center with access to blood component reserves and ICU facilities.[5]

In cases 1, 3, and 4, cesarean deliveries followed by abdominal hysterectomy were planned and performed without complications or adverse events. This reinforces that proper planning of the cesarean section with abdominal hysterectomy—covering the pre-, intra-, and postoperative stages—improves the prognosis of placental accretion, in line with findings from previous studies.

Conservative management of placental accretion, leaving the placenta in situ, may be considered in rare cases when fertility preservation is desired. However, these patients must remain under strict monitoring and be fully informed about the significant risk of severe complications.[1]

Conservative treatment (maintaining the uterus and leaving the placenta in situ) should be considered exceptional due to the high morbid-mortality associated with it.[21]

In case 2, a cesarean delivery with abdominal hysterectomy (HTA) was initially planned. However, during the procedure, the decision was made to preserve the uterus with the placenta in situ. The patient developed hemorrhagic shock 4 hours after the surgery, requiring emergency hysterectomy in a second stage. Conservative treatment should be considered only as an exception, as it carries significant risks of complications.

In all the reported cases, the final treatment involved abdominal hysterectomy (HTA), which aligns with the literature as the best therapeutic approach. Conservative treatment (maintaining the uterus and leaving the placenta in situ) exposes the patient to many complications and should be chosen only in rare cases, following thorough medical counseling for the pregnant patient and their family.

The ideal gestational age (GA) for intervention is still controversial. There is consensus that it should be between 34 and 37 weeks due to pulmonary maturation.[17] According to Zugaib[1], for patients with an early diagnosis, an elective cesarean section at 36/37 weeks is recommended to reduce the risk of complications.

The average gestational age for pregnancy termination in all cases was 34 weeks and 6 days (range: 27 weeks and 6 days to 39 weeks). In case 3, a monochorionic diamniotic twin pregnancy with twin-to-twin transfusion syndrome, the pregnancy was terminated at 27 weeks and 5 days due to vaginal bleeding. The fetuses were born alive but did not survive due to prematurity. In the other cases, all the newborns survived.

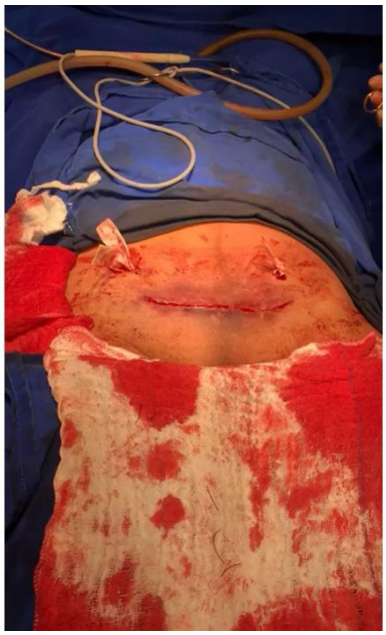

Figure 9: Immediate postoperative cesarean section/total hysterectomy for placental accreta and drainage of the peritoneal cavity.

FINAL CONSIDERATIONS

Placental accreta is a pathology with high mortality, but proper management with early diagnosis and birth planning has the potential to improve the prognosis.

Early diagnosis is of fundamental importance in this pathology. Pregnant women with a history of previous cesarean section, placenta previa, multiparity, maternal age over 35 years, and endometrial defects are at increased risk for accreta. Previous cesarean section is considered the most relevant risk factor, with the risk of placental accreta increasing with the number of previous surgeries.

Ultrasound is an excellent tool for evaluating placental pathologies. Therefore, if requested during prenatal care for patients with risk factors, early diagnosis will assist in planning the appropriate treatment.

The planning (preoperative, intraoperative, and postoperative) of the delivery with pulmonary maturation, reserve of blood concentrates, in a tertiary hospital with maternal and neonatal ICU and an experienced multidisciplinary team, changes the prognosis of placenta accreta, improving maternal and fetal survival.

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SCIENTIFIC ARTICLE - CASE REPORT

BALANCED GENERAL ANESTHESIA IN TUMOR THROMBECTOMY IN THE VENA CAVA AND RIGHT ATRIUM WITH RADICAL NEPHRECTOMY: CASE REPORT

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ABSTRACT

Introduction: Among malignant tumors in adults, kidney tumors account for 2 to 3% of cases. Renal cell carcinoma has a predisposition to vascular invasion, presenting inferior vena cava thrombus in 4 to 10% of patients, extending to the right atrium in approximately 1% of cases. Tumor thrombectomy is the gold standard treatment, increasing the survival rate of these patients. **Case Report:** Individual undergoing tumor thrombectomy in the vena cava and right atrium associated with radical nephrectomy. In the surgical center, the patient was properly monitored. Important component signs, required for a balanced general anesthesia. Pre-oxygenation under a face mask at 10 l/min, induction with ketamine, dexmedetomidine, lidocaine, sulfentanil, propofol and rocuronium. And anesthetic maintenance with sevoflurane and remifentanil pump. Intraoperatively, dissection of the renal area and exposure of the vena cava began. Then, a sternotomy was performed and extracorporeal circulation was started, with a successful tumor thrombectomy. During the surgery, without complications and at the end, the patient was still under mechanical ventilation to the intensive care unit, extubated in less than 24 hours, with electrical signs and without any allergic complaints. **Discussion:** Tumor thrombus within the inferior vena cava and/or right atrium is a relatively rare occurrence, when arising from renal and adrenal tumors. Atrial invasion is relatively rare and affects only 1% of cases with vascular invasion. Perioperative assessment and determination of the level of tumor thrombus is extremely important for determining the operative and anesthetic proposal.

Keywords: Thrombectomy, Carcinoma renal cell, Nephrectomy, Vena cava, Right atrium.

INTRODUCTION

Among malignant tumors in adults, renal tumors account for 2% to 3% of cases. Renal cell carcinoma has a tendency for vascular invasion, with inferior vena cava thrombus occurring in 4% to 10% of patients and extending to the right atrium in approximately 1% of cases. The potentially curative treatment for non-metastatic renal tumors is surgery with the removal of the tumoral thrombus, which increases patient survival.[1]

The number of these tumors has been increasing in recent decades, making them the third

leading cause of death among urinary tract tumors. The planning of anesthetic management in major surgeries must always be carried out with extreme care and precision, considering the high risk of complications.[1]

This report is part of the rare cases of renal tumors with invasion of the right cardiac chamber, highlighting the importance of a thorough preoperative assessment, including clinical evaluation, laboratory tests, and imaging studies, to determine the most appropriate anesthetic technique. This study aims to demonstrate a meticulous and cautious anesthetic approach in a surgery with a high potential for complications, as well as the necessary precautions taken and the resulting outcomes.[1,2]

CASE REPORT

A 51-year-old male patient, weighing 70 kg and measuring 165 cm, underwent a pre-anesthetic consultation, during which grade 1 hypertension controlled with Acertil® was identified. No other comorbidities were noted, and the patient was classified as having low cardiac risk with no contraindications for the planned procedure. In the operating room, the patient underwent tumoral thrombectomy in the right atrium and radical nephrectomy. The anesthesia team implemented appropriate monitoring, including invasive blood pressure (IBP), pulse oximetry, electrocardioscopy, Conox®, temperature, and urine output. Peripheral venous access was established with two 16G cannulas, while IBP was monitored using an 18G cannula. A central venous line was placed, and a Foley catheter (14 Fr) was inserted for urinary drainage. Preoxygenation was performed with a face mask at 10 L/min, followed by anesthetic induction using 150 mg of propofol, 70 mg of lidocaine, 35 mcg of sufentanil, 30 mg of ketamine, 70 mcg of dexmedetomidine, and 50 mg of rocuronium. Direct laryngoscopy was performed atraumatically, followed by orotracheal intubation with an 8.0 mm tube (Cormack-Lehane grade 2A) without complications. For anesthetic maintenance, 2% sevoflurane and remifentanil via target-controlled infusion (TCI) were used. Antibiotic prophylaxis was administered with 1.5 g of cefuroxime 40 minutes before the surgical incision. Adjunct medications included 10 mg of dexamethasone, 2 g of dipyrone, 4 mg of ondansetron, and 10 mg of methadone. At the beginning of the procedure, the urology team performed a midline incision extending to the xiphoid process, followed by layered dissection to access the peritoneal cavity. The renal hilum was exposed, and the anterior wall of the inferior vena cava was fully dissected. The ureter was ligated, and the renal vein containing the thrombus, along with the renal artery, was isolated. (Figure 1)

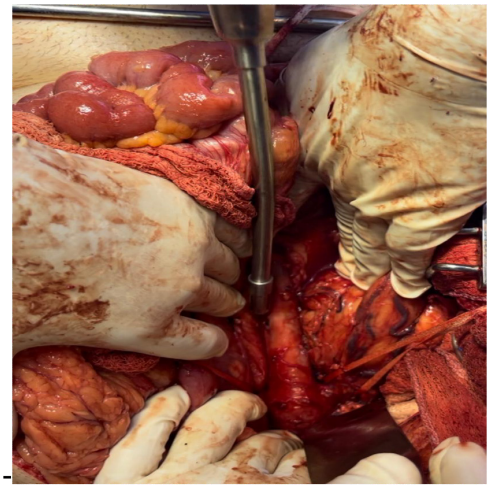

Figure 1. Image showing a midline incision extending to the xiphoid process, with the inferior vena cava at the center, and the isolated renal veins and arteries.

The thoracic phase of the procedure was initiated with the cardiac surgery team, performing a sternotomy and establishing cardiopulmonary bypass (CPB). The cardiac surgeon proceeded with an incision in the right atrium and the ventral region of the superior vena cava, allowing visualization of a large thrombus within the vena cava. (Figure 2)

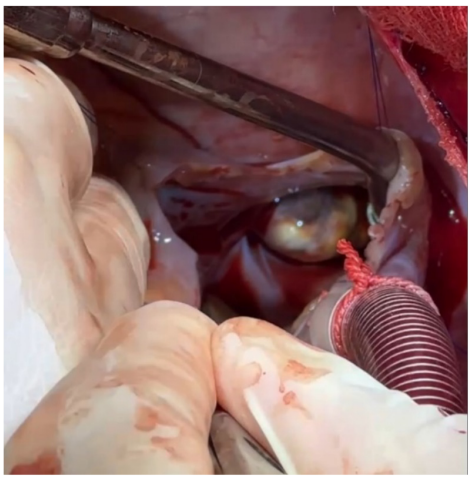

Figure 2: Visualization of a tumoral thrombus in the right atrium emerging from the inferior vena cava.

The urological, cardiac, and vascular teams attempted to remove the large tumoral thrombus, which extended from the renal vein to the right atrium, using a Foley catheter (Figure 3). Initially, the attempt was unsuccessful, and manual removal was required with the assistance of forceps by the cardiac surgeon via the atrium and the vascular surgeon via the inferior vena cava. The thrombus was successfully removed (Figure 4) after several attempts.

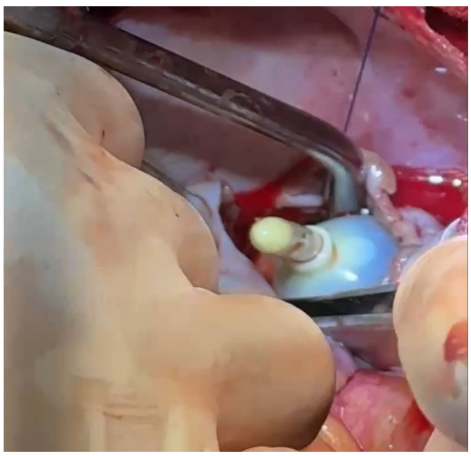

Figura 3: Sonda Foley emergindo de veia cava para auxílio em retirada de trombo tumoral.

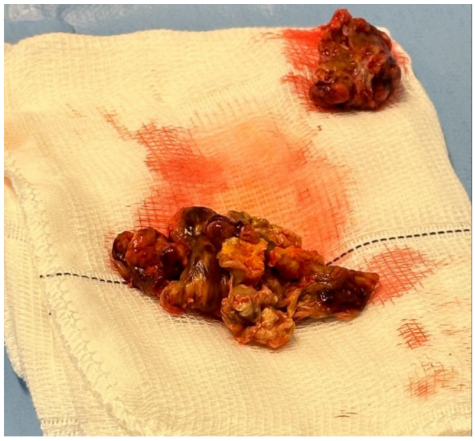

Figure 4: Thrombus removed from the inferior vena cava with invasion into the right atrium.

After the successful removal of the tumoral thrombus, the procedure proceeded with the right radical nephrectomy, which was completed without complications or difficulties, due to the prior dissection of tissues to expose the renal hilum and right kidney, performed by the urology team at the beginning of the surgery.

The patient was removed from cardiopulmonary bypass (CPB) after 58 minutes, and the chest and abdominal wall closures were performed by the surgical teams. During balanced general anesthesia, sequential doses of rocuronium, cefuroxime, and target-controlled propofol via CONOX® were administered. While still on CPB, 1 unit of hemoconcentrate and 3 units of fresh frozen plasma were given to correct intraoperative disturbances. After removal from CPB, nitroprussiate doses were titrated to manage volume accommodation, with no need for vasopressor medications. The patient's fluid balance was positive by 680 ml, and the blood balance was positive by 600 ml.

The surgery lasted approximately seven hours, and at the end, the patient was transferred to the Intensive Care Unit (ICU) still under mechanical ventilation, maintaining stable vital signs without the need for vasopressor medications. In the ICU, the patient was extubated in less than 24 hours. Postoperatively, the patient was conscious, oriented, and without pain or any other complaints. The patient was discharged after seven days of hospitalization.

DISCUSSION

Tumoral thrombus within the inferior vena cava (IVC) or right atrium is a relatively rare occurrence when originating from renal or adrenal tumors. Radical nephrectomy associated with this tumoral thrombectomy is an approach that requires an experienced and often multidisciplinary team, including urological surgery, vascular surgery, and cardiothoracic surgery.[1]

Renal cell carcinoma extends to the renal vein and inferior vena cava in up to 25% of patients with this diagnosis and reaches the right atrium in approximately 1% of cases.[3]

Perioperative evaluation and determination of the level of the tumoral thrombus are of utmost importance for defining the surgical and anesthetic approach, as the determination of the surgical field and the area addressed by the surgeon is essential for a refined anesthetic management.[4]

The Neves-Zinke classification is one of the most commonly used to define the level of the tumoral thrombus. Level III thrombi are subdivided into four groups: IIIa (retrohepatic IVC below the main hepatic veins), IIIb (retrohepatic IVC reaching the ostia of the main hepatic veins), IIIc (retrohepatic IVC extending above the main hepatic veins but below the diaphragm), and IIId (suprahepatic and supradiaphragmatic IVC, reaching the intrapericardial IVC but infra-atrial) (Figure 5).[3]

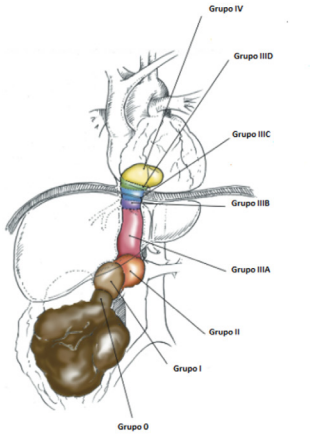

Figure 5: Image showing the levels that the thrombus can reach.

In the described case, the patient had a level IV tumoral thrombus according to the Neves-Zinke classification, as inferred from a preoperative transesophageal echocardiogram (TEE) (Figure 6) and magnetic resonance imaging. It is known that intraoperative TEE provides real-time, precise delineation of the tumoral thrombus and has the potential to alter decision-making and surgical management. Preoperative TEE accurately delineates the presence and extent of the tumoral thrombus in the IVC in 85% of patients, compared to 90% for magnetic resonance imaging and 75% for cavography.[5]

The importance of intraoperative TEE in patients undergoing radical nephrectomy for RCC is evident, as this method provides real-time, accurate information about the presence and extent of thrombus involvement in the IVC. The information obtained from TEE frequently influences the surgical decision-making, particularly in patients with intracardiac tumoral extension.[5]

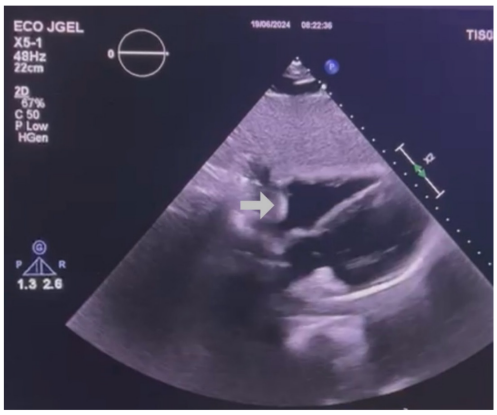

Figure 6: Preoperative transesophageal echocardiogram of the patient showing the emergence of the tumoral thrombus from the vena cava into the right atrium.

Despite advancements in medical treatment, such as targeted therapy, surgical resection remains the primary and most effective treatment for renal cell carcinoma with venous tumoral thrombus extension, offering the greatest potential for a cure. Studies project durable cancer-free survival following radical nephrectomy and tumoral thrombectomy, as seen in the described case.

Surgical innovation has revolutionized the treatment of Renal Cell Carcinoma with tumoral thrombus, reducing morbidity and mortality through minimally invasive techniques while maintaining oncological effectiveness.

Surgical treatment should be the choice in these cases, as chemotherapy or radiotherapy does not show effectiveness in these situations. Proper, careful, and attentive anesthetic management becomes crucial in this procedure, given the surgical scale, procedure duration, and high risk of intra- and post-operative complications.

CONCLUSION

This article presents a rare case of tumoral thrombus with atrial invasion and allows us to infer that preoperative planning, outlining goals and objectives, is essential for managing such a complex surgery. It highlights the importance of a humanized and integrated approach between the teams to ensure patient comfort and safety. Since the first-line treatment is surgical, an experienced surgical and anesthetic team is vital for a smooth procedure with high resolution and minimal complications.

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SCIENTIFIC ARTICLE - CASE REPORT

TEMPORAL DISTRIBUTION OF LEPROSY NOTIFICATION RATES IN GOIÂNIA

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ABSTRACT

Introduction: Introduction: Leprosy is a chronic infectious disease that remains a public health challenge in Brazil, with high prevalence in vulnerable regions. The COVID-19 pandemic has worsened underreporting and access to diagnosis. Objective: To describe the temporal and sociodemographic distribution of leprosy notifications in the city of Goiânia. **Method:** Descriptive and observational study with secondary data on leprosy notifications, from 2014 to 2023. The data were obtained from the SINAN public domain website. All notifications from the period were considered. Population data were extracted from IBGE, and the variables used are gender, age group, education and race. Results: 2,188 cases of leprosy were recorded in the period, with a prevalence reduced from 25.63 to 8.71 per 100 thousand inhabitants. Men (59.8%) and mixed race (55.7%) had the highest number of cases. The COVID-19 pandemic negatively impacted the diagnosis of the disease, with partial recovery starting in 2022. **Conclusion:** Despite the reduction in cases, underreporting and inequality in access to health services remain challenges for the population. Inclusive and intersectoral strategies are needed for effective leprosy control.

Keywords: Leprosy, Goiânia, Public health, Social inequality, Epidemiology.

INTRODUCTION

Leprosy is one of the oldest recorded diseases, with evidence of its presence dating back to ancient civilizations such as Egypt and India. Caused by Mycobacterium leprae, the disease spread across various parts of the world and became strongly associated with social stigma. During medieval Europe, those affected were isolated in leper colonies, a practice that persisted for centuries as a form of social control.[1] Despite scientific advances and global eradication campaigns, leprosy still persists, particularly in countries in Asia and Latin America.[2]

On the international scene, India, China, and Indonesia remain among the countries with the highest burden of the disease. In the United States, although leprosy is rare, cases are still reported in states such as Texas and Florida due to environmental and migratory factors.[3] In Europe, the disease has been virtually eradicated, with only a few sporadic cases linked to immigration from endemic regions.[4] These data reflect that, despite advancements, leprosy remains a challenge in

different geographical contexts.

In Brazil, leprosy has deep historical roots dating back to the colonial period. For a long time, the response to the disease was the compulsory isolation of patients in leper colonies, a practice that was abandoned in the 1940s with the introduction of drugs such as sulfa.[5] However, Brazil still holds a prominent global position in terms of the number of cases, alongside India and Indonesia, according to data from the World Health Organization.[6] The challenge is particularly significant in the North, Northeast, and Central-West regions, where poor socioeconomic conditions and limited access to healthcare services hinder disease control.[7]

In Brazilian capitals such as Manaus, Fortaleza, and São Luís, leprosy remains prevalent, reflecting a combination of social factors and limitations in early diagnosis.[8] Medium and small-sized cities also face challenges in controlling transmission, demonstrating that the problem is not restricted to large urban centers.[5] Diagnostic campaigns have expanded, but the disease persists, requiring continuous efforts for its control.[2]

Although Brazil follows WHO recommendations, providing free diagnosis and treatment through the Unified Health System (SUS), significant obstacles remain, such as stigma and social discrimination. These factors hinder treatment adherence and the reintegration of patients. The elimination of leprosy as a public health problem depends not only on effective diagnosis and treatment but also on strategies that combat stigma and promote awareness.[4]

The general objective of this article is to describe the temporal distribution of the leprosy notification rate in Goiânia from 2014 to 2023. Specifically, it aims to analyze the sociodemographic profile of patients and describe the leprosy prevalence coefficient in the municipality throughout the analyzed period.

The relevance of this research lies in the need to better understand how leprosy manifests in different population groups and at different times, especially considering the impact of crises, such as the COVID-19 pandemic, on the diagnosis and treatment of the disease. In this way, the analysis will help identify patterns and gaps in leprosy control, contributing to the formulation of more effective public policies.

The methodology adopted is based on a quantitative analysis of epidemiological data provided by the surveillance system of the municipality of Goiânia. The data used is publicly available, extracted from the Notification Disease Information System (SINAN), provided by DATASUS, which centralizes information collected by the Municipal Health Department (SMS). Additionally, estimated population data was obtained from the Brazilian Institute of Geography and Statistics (IBGE), ensuring greater accuracy in the analysis of prevalence coefficients.

As the data is public and already consolidated, it was not necessary to seek approval from the Research Ethics Committee involving Human Beings. Secondary data on notifications registered between 2014 and 2023 will be considered, allowing for a detailed description of the disease's evolution and identifying relevant patterns for the formulation of public policies.

METHODS

This is a descriptive and observational study that used a quantitative approach based on publicly available epidemiological data provided by the Notification Disease Information System (SINAN), made available by DATASUS. Population information was obtained from the Brazilian Institute of

Geography and Statistics (IBGE) from the 2022 census, ensuring greater accuracy in the calculation of prevalence coefficients.

Leprosy notification data was directly extracted from SINAN for the period from 2014 to 2023, covering information such as the number of reported cases, sociodemographic profile (gender, age group, education level, and race), and prevalence coefficients. Additional information on population estimates was obtained from the official IBGE website.

The collected data was organized into tables and analyzed using descriptive statistics. The prevalence coefficient was calculated considering the number of reported cases per 100,000 inhabitants each year, based on population estimates. The interpretation of the results was grounded in current scientific literature, allowing for discussions that align with the local, national, and global epidemiological context.

The study is limited to the analysis of secondary data, which may restrict the scope of the conclusions due to the possibility of underreporting, especially during the COVID-19 pandemic. Additionally, the lack of more detailed socioeconomic variables makes it difficult to assess some social determinants related to leprosy.

Since the data is public, consolidated, and anonymized, the study was exempt from ethical review by the Research Ethics Committee with Human Beings, in accordance with Resolution No. 510/2016 of the National Health Council.

RESULTS AND DISCUSSION

General analysis of reported leprosy cases in goiânia (2014-2023)

Table 1 – Temporal Distribution of Leprosy in the City of Goiânia, from 2014 to 2023.

Year of Diagnosis	Frequency
2014	362
2015	322
2016	265
2017	275
2018	228
2019	222
2020	122
2021	149
2022	117
2023	126
Total	2.188

Source: Brazil - Ministério da Saúde [9]

Between 2014 and 2023, 2,188 cases of leprosy were reported in the city of Goiânia. The distribution over these years reveals important patterns that reflect both epidemiological and contextual factors, such as the influence of the COVID-19 pandemic on healthcare services.

Evolution Over the Period

There was a progressive reduction in the number of cases over the years, decreasing

from 362 notifications in 2014 to 126 in 2023. This decline may indicate advances in leprosy control, but it could also be associated with underreporting and reduced access to healthcare services at certain times.

• Year with the Highest Record: 2014 had the highest number of notifications, with 362 cases.

• Year with the Lowest Number of Notifications: 2020 recorded 122 cases, reflecting the direct impact of the pandemic.

• Gradual Recovery: After the decline during the pandemic, an increase in cases was observed starting in 2021, with 149 notifications, signaling the resumption of diagnosis and care.

Impact of the COVID-19 Pandemic on Leprosy Patients

COVID-19 brought restrictions to access healthcare services, redirecting the focus of public systems towards controlling the pandemic. As a result, there was a sharp decline in diagnoses in 2020 and 2021. This does not necessarily indicate a real decrease in leprosy cases, but rather a temporary interruption in surveillance and diagnostic activities.

Post-Pandemic Distribution and Recovery

Starting in 2022, the numbers began to stabilize, with 117 cases in 2022 and 126 in 2023, indicating a partial recovery in notifications. This suggests that the resumption of healthcare services and the increase in diagnostic activities helped bring back some cases that may have gone unnoticed during the pandemic.

ANALYSIS OF LEPROSY CASES ACCORDING TO EDUCATION LEVEL, FROM 2014 TO 2023

Leprosy data in Goiânia from 2014 to 2023, collected from the DATASUS website, show a significant distribution across different education levels. The analysis of these figures highlights relevant patterns that reflect how access to education and socioeconomic conditions influence public health.

Table 2 – Distribution of Leprosy Cases According to Education Level in the City of Goiânia, from 2014 to 2023

Education Level	Cases (n)	Percentage (%)
Illiterate	94	4.3
1st to 4th Grade Incomplete	337	15.4
4th Grade Complete	190	8.7
5th to 8th Grade Incomplete	390	17.8
Complete Elementary School	213	9.7
Incomplete High School	179	8.2
Complete High School	405	18.5
Incomplete Higher Education	47	2.1
Complete Higher Education	153	7.0
Unknown/Blank	173	7.9
Total	2181	100

Source: Brazil - Ministério da Saúde [9]

• Illiterate: The lowest frequency was recorded in 2023, with only 1 case, while 2017 saw the peak with 18 notifications.

• Incomplete 1st to 4th Grade: One of the groups with high prevalence, although it showed a sharp decrease after 2018.

• Complete 4th Grade: The distribution was relatively stable, with modest fluctuations throughout the period.

• Incomplete 5th to 8th Grade: This group showed high numbers and peaks in years like 2017, suggesting significant vulnerabilities.

• Complete Elementary School: Showed a constant decrease over the years, indicating improvement in diagnosis and treatment at certain points.

• Incomplete High School: Heterogeneous distribution, but with a noticeable reduction in recent years.

• Complete High School: This was the group with the highest number of notifications, especially before the pandemic.

• Incomplete Higher Education: The lowest prevalence among the educational groups, with minimal fluctuation over time.

• Complete Higher Education: The frequency remained stable, suggesting that individuals with higher education may have better access to early diagnosis and treatment.

• Unknown/Blank: Fluctuations throughout the years suggest possible gaps in data collection.

Observed patterns

The highest concentration of cases among people with low levels of education (such as incomplete 1st to 4th grade and 5th to 8th grade) highlights the relationship between educational vulnerability and health. Groups with lower educational levels may face difficulties accessing information, early diagnosis, and proper treatment.

On the other hand, the high frequency of notifications among people with completed high school (405 cases) highlights that leprosy does not only affect those in extreme vulnerability. This may reflect social and behavioral factors, such as limited access to the public healthcare system, even among groups with higher education levels.

Impact of the pandemic

As in the general analysis, the COVID-19 pandemic significantly impacted the records. Between 2020 and 2021, all education categories showed a sharp decline, with partial recovery starting in 2022. This reinforces that the interruption of healthcare services hindered both the diagnosis and treatment of leprosy.

ANALYSIS OF LEPROUS CASES BY GENDER (2014-2023)

The distribution of leprosy cases in Goiânia between 2014 and 2023, collected from the DATASUS website, reveals that men were more frequently diagnosed than women throughout the period. This difference may indicate both behavioral and social factors, as well as access barriers that affect the two groups in distinct ways.

Table 3 - Distribution of leprosy cases (female) by year of diagnosis, Goiânia municipality 2014-2023

Year of Diagnosis	Frequency
2014	145
2015	128
2016	111
2017	101
2018	93
2019	95
2020	52
2021	60
2022	43
2023	51
Total	779

Source: Brazil - Ministério da Saúde [9]

Table 4 - Distribution of leprosy cases (male) by year of diagnosis, Goiânia municipality 2014-2023

Year of Diagnosis	Frequency
2013	2
2014	217
2015	194
2016	154
2017	174
2018	135
2019	127
2020	70
2021	89
2022	74
2023	75
Total	1.311

Source: Brazil - Ministério da Saúde [9]

The highest number of diagnosed cases in females occurred in 2014, with 145 cases, while the lowest number was in 2022, with 43 cases. The recovery was slower among women over the years, with numbers remaining below the levels observed at the beginning of the period.

The male sex had the highest number of diagnoses in 2014, with 217 cases, and the lowest number in 2020, with 70 cases. After the drop in cases in 2020, the numbers began to rise again in 2021 and 2022, but they did not return to pre-pandemic levels.

Patterns and differences between sexes

The higher incidence of leprosy in men can be explained by a combination of factors. Men generally seek healthcare services less often, which may lead to delayed diagnoses and greater disease spread. Additionally, increased exposure to hazardous work or risky environmental conditions can increase their vulnerability to infection.

On the other hand, the lower prevalence among women does not indicate natural immunity but may reflect cultural and social factors, such as women's greater concern with preventive health. However, the impact of family and economic responsibilities can limit some women's access to appropriate treatment, contributing to the silent progression of the disease.

ANALYSIS OF LEPROSY CASES BY RACE (2014-2023)

The distribution of leprosy cases in Goiânia by race between 2014 and 2023, collected from the DATASUS website, reveals distinct patterns among the analyzed groups. The data indicates that, although socioeconomic factors and racial inequality may influence prevalence, the high concentration of cases among mixed-race individuals also reflects the large representation of this group in the population.

Table 5 - Distribution of leprosy cases (by race) by year of diagnosis, municipality of Goiânia 2014-2023.

Year of Diagnosis	White	Black	Asian	Brown	Indigenous
2014	114	36	1	205	1
2015	96	37	3	184	0
2016	96	29	0	134	0
2017	75	41	3	156	0
2018	70	22	4	130	1
2019	75	27	0	119	0
2020	40	9	0	69	1
2021	47	7	2	91	0
2022	41	9	0	66	0
2023	48	13	0	64	1
Total	702	230	13	1218	4

Source: Brazil - Ministério da Saúde [9]

The total number of diagnoses in brown people was 1,218 cases, which shows a dominant presence compared to the numbers of cases in other races, reflecting both social and demographic factors. The highest number of records in brown people was in 2014, with 205 cases, and the lowest was in 2023, with 64 diagnoses.

White individuals had a total of 702 diagnoses during the analyzed period, with the highest number of records in 2014 (114 cases) and the lowest number in 2020 (40 cases). These data show that leprosy is not limited to historically vulnerable groups but also affects populations with greater access to resources.

The total number of diagnoses in Black individuals was 230 cases, with the highest number of cases in 2017 (41 records) and the lowest number in 2020 (9 cases) and 2021 (7 cases). This group faces additional challenges due to structural inequalities that may hinder diagnosis and treatment.

The Asian ethnic group recorded a total of only 13 cases during the analyzed period, with

a sparse distribution over the years, and absences in several periods. This could indicate underreporting or limited access to healthcare services.

The Indigenous group had only 4 diagnosed cases, making it the group with the lowest incidence, showing a low frequency and irregular records over time.

The high concentration of cases among mixed-race individuals reflects both social vulnerabilities and the greater representation of this group in the population of Goiânia. This suggests that the higher prevalence of the disease among mixed-race individuals cannot be attributed exclusively to racial inequality. On the other hand, the significant number of cases among white individuals demonstrates that leprosy is not limited to marginalized groups, affecting various social segments. The authors suggest the same in a study conducted in the Southeast region of Brazil; according to the authors, about 45.3% of the population identifies as mixed-race, which partly justifies such a high percentage of cases in this population.[10]

Consistently, another study concludes that race, by itself, does not imply a lower risk or greater resistance to leprosy. Instead, underreporting and lack of access to healthcare services emerge as the main factors behind the observed differences.[11] Although the data show lower numbers of cases among Black, Asian, and Indigenous groups, this does not necessarily indicate a reduced risk but may reflect limitations in case reporting and access to proper healthcare.

ANALYSIS OF LEPROSY CASES BY AGE GROUP FROM 2014 TO 2023

The data on the distribution of leprosy cases by age group in Goiânia, from 2014 to 2023, collected from the DATASUS website, reveal significant patterns that reflect the differential vulnerability of each group over the years.

Distribution of cases by age group

• Under 1 year: No cases were recorded throughout the period, indicating that exposure to Mycobacterium leprae can be minimized in the first months of life, possibly due to intensive care and reduced social contact.

• 1 to 4 years: Only 2 cases were reported in 2015, suggesting low exposure in this age group. This may be related to the fact that young children have less interaction outside the family environment.

• 5 to 9 years: A total of 20 cases spread over the years, with a peak in 2014 (7 cases), shows sporadic occurrences. This distribution highlights the importance of educational and control programs to prevent early exposure.

• 10 to 14 years: With 31 cases, this age group shows greater vulnerability compared to younger groups. The gradual increase in cases over the years suggests that early adolescence may be a period of higher risk due to increased social interactions and community activities.

• 15 to 19 years: The occurrence of 59 cases reflects that this phase of adolescence is a critical period, with a peak in 2016 (12 cases). Exposure in school and community environments may explain this trend.

• 20 to 29 years: This age group recorded a significant number of cases, with a higher concentration in the pre-pandemic years. High mobility and greater social integration in this group suggest increased vulnerability to infection.

• 30 to 39 years: The progressive decrease in cases over the years, from 75 in 2014 to 10 in

2023, suggests that young adults may have benefited from improvements in diagnostic and prevention programs.

• 40 to 49 years: The 451 cases recorded indicate one of the most affected age groups. Occupational factors and working conditions may explain this high prevalence, especially before the pandemic.

• 50 to 59 years: This group had the highest incidence, with 479 cases throughout the period. The significant presence of cases may be related to comorbidities and difficulty accessing early diagnosis.

• 60 to 69 years: The prevalence in the elderly (351 cases) underscores the need for continuous monitoring, as chronic conditions and limited access to healthcare services negatively impact detection and treatment.

• 70 to 79 years: With 191 cases, this age group shows that leprosy remains a challenge even in advanced ages, highlighting the importance of health policies targeting the elderly.

• 80 years or more: Although fewer in number (58 cases), records in this age group highlight the need for continuous monitoring, especially considering the impact of the pandemic on access to healthcare services.

Observed Patterns

The analysis reveals that leprosy affects different age groups, but it is more prevalent among adults aged 30 to 59 years, highlighting the vulnerability of this population. The higher incidence in adults suggests that factors such as occupation and lifestyle increase the risk of exposure. In contrast, children and adolescents, although less affected, require attention to ensure early diagnosis and prevent transmission.

Table 6 – Prevalence Rate of Leprosy in Goiânia, from 2014 to 2023, per 100,000 inhabitants.

Year	Estimated Population	Leprosy Cases	Prevalence Rate/100,000
2014	1,412,364	362	25.63
2015	1,430,697	322	22.51
2016	1,446,366	265	18.32
2017	1,466,105	275	18.76
2018	1,485,505	228	15.35
2019	1,503,752	222	14.76
2020	1,516,113	122	8.05
2021	1,425,131	149	10.46
2022	1,437,366	117	8.14
2023	1,445,932	126	8.71

Source: IBGE - Brazilian Institute of Geography and Statistics [12]

Table 6 shows a consistent reduction in the leprosy prevalence rate over the years, dropping from 25.63 per 100,000 inhabitants in 2014 to 8.71 per 100,000 in 2023. This decline may indicate improvements in disease control and prevention, reflecting the efforts of public

policies and awareness campaigns.

However, a significant impact from the COVID-19 pandemic is observed in 2020 and 2021, periods in which the prevalence rate showed more pronounced declines. This can be attributed to a reduction in the search for medical care and disruptions in healthcare services, hindering early diagnosis and treatment of leprosy. Starting in 2022, the rate shows a slight recovery, suggesting a gradual resumption of surveillance and diagnostic activities.

The slight fluctuation in the population between 2021 and 2023 may be related to COVID-19 mortality and internal migration, impacting population estimates and, consequently, the calculation of prevalence. Despite these fluctuations, the continuity of surveillance efforts is essential to ensure early detection and prevent underreporting of the disease.

CONCLUSION

The study highlights a higher incidence among individuals with low education, emphasizing how educational vulnerability is linked to public health. Limited access to information and healthcare services hinders early diagnosis and effective treatment. However, the high frequency of cases in individuals with a complete high school education reinforces that leprosy is not restricted to the most vulnerable groups, also affecting other social strata.

Leprosy had a higher prevalence among men (59.8%), which can be explained by factors such as lower healthcare-seeking behavior and greater exposure to unhealthy working conditions. Although women were affected less frequently, they were still significantly impacted, suggesting the need for specific strategies for both sexes.

The high concentration of cases among mixed-race individuals (55.7%) reflects not only social vulnerabilities but also the demographic representativeness of this group in Goiânia. Leprosy also affects white and black groups, indicating that the disease is not restricted to specific races or socioeconomic conditions. The low frequency of cases among Asians and Indigenous people suggests potential gaps in reporting and access to diagnosis.

The pandemic had a significant effect on the decline in notifications, especially in 2020 and 2021, hindering the continuity of diagnosis and treatment. Starting in 2022, there was a gradual recovery in numbers, but they are still far from the levels seen before the pandemic. This underscores the need for resilience in surveillance systems to ensure that neglected diseases, such as leprosy, are not neglected during times of crisis.

Leprosy in Goiânia between 2014 and 2023 presented a complex scenario involving educational, demographic, and social aspects. Although factors such as social and racial inequality are relevant, the analysis shows that the prevalence of the disease cannot be explained by a single isolated factor. The interaction between living conditions, access to healthcare, education, and social behavior must be considered to develop effective public policies.

FINAL CONSIDERATIONS

The analysis of leprosy cases in Goiânia between 2014 and 2023 reveals consistent patterns of inequality and socioeconomic impact, reflected in the distribution by education, sex, and race. The data show that although factors such as social inequality influence the prevalence of the disease, a more comprehensive approach is essential to understand the dynamics involved.

It is essential that leprosy prevention and control strategies are comprehensive and targeted, taking into account the specific characteristics of each affected group. Promoting equity in access to diagnosis and treatment, as well as strengthening epidemiological surveillance, are key to reducing the incidence of the disease and mitigating its long-term impacts.

In addition, continuous investment in educational campaigns is necessary to reduce the social stigma associated with the disease and encourage active pursuit of early diagnosis. Partnerships between the public and private sectors can also help expand the reach of control policies and strengthen healthcare actions in areas of greater vulnerability. The implementation of public policies that ensure comprehensive patient care, from diagnosis to social reintegration, is essential to reduce the impact of leprosy on the lives of affected individuals.

Policies that combat structural inequalities are essential to address the root causes of vulnerability to leprosy. Investments in education, healthcare, and social inclusion can not only reduce the incidence of the disease but also improve the quality of life of the most affected populations, consolidating a fairer and more effective healthcare system.

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SCIENTIFIC ARTICLE - CASE REPORT

LEADLESS PACEMAKER IN PATIENTS WITH CHRONIC KIDNEY DISEASE AND HEMODIALYSIS: A SCOPING REVIEW

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ABSTRACT

Introduction: Chronic kidney disease (CKD) is a global health condition affecting approximately 10% of the adult population and is associated with high morbidity and mortality. Patients with CKD are at an increased risk of developing cardiovascular diseases and arrhythmias, often requiring pacemaker implantation. The leadless pacemaker has been studied in various populations and offers advantages over traditional devices. However, the efficacy and safety of using leadless pacemakers in this population remain uncertain. Objective: This study aims to map the existing literature on the use of leadless pacemakers in patients with chronic kidney disease (CKD) undergoing hemodialysis, addressing aspects of efficacy, safety, and factors related to their adoption in clinical practice. **Methodology:** A scoping review was conducted following the PRISMA protocol. Searches were performed in the PubMed, Embase, Scopus, Cochrane Library, and CINAHL databases, covering studies that addressed leadless pacemakers, chronic kidney disease, and hemodialysis. Articles in English, Portuguese, and Spanish were included, with no time restrictions. **Results:** A total of 230 articles were found during the initial search. After the exclusion of duplicates, 165 studies remained and were analyzed based on their titles and abstracts. After the analysis, 25 articles were considered eligible for full-text reading and the application of eligibility criteria. After reading, 15 studies were included in this review. The types of studies found were: 7 (46.6%) case reports, 6 (40%) observational studies, 1 (6.6%) editorial comment, and 1 (6.6%) review article. Among the studies, 7 (46.6%) concluded that the leadless pacemaker is associated with improved clinical outcomes when compared to the transvenous pacemaker in patients with chronic kidney disease and undergoing hemodialysis due to the failure of vascular accesses and the higher risk of infection in this population. One (6.6%) study demonstrated an association between the leadless pacemaker and a higher rate of perioperative and early post-implantation complications when compared to the conventional pacemaker. **Conclusion:** The results of this scoping review suggest that the leadless pacemaker is an effective alternative with a higher safety profile in the medium and long term compared to conventional devices in patients with chronic kidney disease and undergoing hemodialysis. However, the literature remains conflicting regarding safety during the perioperative and early post-implantation periods, and further studies are needed for a better understanding of the topic.

Keywords: Leadless Pacemaker, Chronic kidney disease, Hemodialysis, Effectiveness, Security.

PRESENTATION

Chronic kidney disease (CKD) is a global health condition affecting approximately 10% of the adult population and is associated with high morbidity and mortality.[1] CKD is characterized by the progressive decline in renal function, which can lead to renal failure, requiring treatment through hemodialysis.[2] Furthermore, patients with CKD are at increased risk of developing cardiovascular diseases and cardiac arrhythmias.[3]

Pacemaker therapy is a proven treatment for patients with arrhythmias.[4] The conventional pacemaker is an electronic device capable of stimulating the heart to contract in a synchronized manner, ensuring adequate blood pumping by introducing cardiac electrodes via intravenous access, powered by an implanted generator in the chest.[5] It is a functional device, widely used in clinical practice, but there are concerns regarding potential complications related to its implantation.[6]

In this regard, the leadless pacemaker was developed with improvements in battery design, reduction in component size, and elimination of the need for intravenous electrodes to provide the rhythm.[7] This new device has been studied in various populations and presents advantages over traditional devices, such as a lower risk of infection, shorter implantation time, and reduced aesthetic impact.[8] Furthermore, the leadless technology may offer specific benefits for patients with chronic kidney disease (CKD) undergoing hemodialysis, as venous access is preserved and the risk of infection is reduced.[9]

However, the efficacy and safety of using leadless pacemakers in this population remain uncertain, as well as the factors that may influence their adoption in clinical practice.

Therefore, the present study aims to map the existing literature on the use of leadless pacemakers in patients with chronic kidney disease (CKD) on hemodialysis, addressing aspects of efficacy, safety, and factors related to their adoption in clinical practice.

METHODOLOGY

A scoping review was conducted following the steps suggested by Arksey and O'Malley[10] and Levac, Colquhoun, and O'Brien[11], with adaptations as necessary to meet the specific objectives of this study. The steps included: identification of the research question, identification of relevant studies, selection of studies, data extraction, and analysis and synthesis of the results.

2.1. Search Strategy

2.1.1. Databases Consulted

The systematic search was conducted in the following databases: MEDLINE (via PubMed), Embase, Scopus, Cochrane Library, and CINAHL. Additionally, manual searches were performed in the reference lists of the selected studies and related systematic reviews to identify any additional relevant studies.

2.1.2. Search terms and combinations

The search terms were selected based on the main concepts of the research question, including leadless pacemaker, chronic kidney disease, and hemodialysis. Specific terms and

synonyms were used, as well as MeSH (Medical Subject Headings) and Emtree terms, as appropriate for each database. The search strategies were adapted for each database and combined using the Boolean operators "AND" and "OR."

2.2. Inclusion and Exclusion Criteria

2.2.1. Study Type

Observational studies (cohort, case-control, and cross-sectional), controlled clinical trials, case reports, and case series that addressed the use of leadless pacemakers in patients with CKD and undergoing hemodialysis were included. Systematic reviews, meta-analyses, and qualitative studies were excluded, but their reference lists were checked to identify additional studies.

2.2.2. Target Population

Studies involving adult patients (≥18 years) with chronic kidney disease undergoing hemodialysis who require pacemaker therapy were included.

2.2.3. Intervention

The intervention of interest is the implantation of a leadless pacemaker for the treatment of cardiac arrhythmias in patients with CKD and hemodialysis.

2.2.4. Comparison

Comparative studies should compare leadless pacemakers with conventional pacemakers with leads or other therapies for cardiac arrhythmias.

2.2.5. Outcomes

The outcomes of interest included, but were not limited to: effectiveness in maintaining regular heart rhythm, adverse effects, complications, quality of life and patient satisfaction, and factors influencing the use of leadless pacemakers in this population.

2.3. Study Selection Process

2.3.1. Initial Screening of Titles and Abstracts

Two reviewers independently performed the initial screening of the titles and abstracts of the studies identified through the search strategy. Potentially relevant studies were selected for full-text analysis. Disagreements between reviewers were resolved by consensus or, when necessary, with the participation of a third reviewer.

2.3.2. Full-Text Assessment

The full texts of the studies selected in the previous step were independently evaluated by two reviewers based on the pre-established inclusion and exclusion criteria. Disagreements were resolved by consensus or with the participation of a third reviewer.

2.4. Data Extraction

A standardized data extraction form was developed and tested by the reviewers before the data extraction process began. The following data were extracted from the selected studies: author(s), year of publication, study location, study design, sample size, population characteristics, details of the intervention and comparison, outcomes evaluated, and results.

2.5. Analysis and Synthesis of Results

The results of the included studies were synthesized in a narrative review, grouped according to the outcomes of interest and organized into relevant themes related to the research question. Tables and graphs were presented, as necessary, to facilitate the understanding and interpretation of the results.

2.6. Identification of Gaps and Recommendations for Future Research

Based on the analysis and synthesis of the results, gaps in the literature and areas where further research is needed were identified. These gaps included issues related to the efficacy and safety of leadless pacemakers in specific subgroups of patients with CKD and hemodialysis, long-term outcomes, or issues related to the implementation and acceptance of this technology by healthcare professionals and patients.

RESULTS AND DISCUSSION

A total of 230 articles were found during the initial search. After duplicates were removed, 165 studies remained and were analyzed based on their titles and abstracts. After this analysis, 25 articles were deemed eligible for full-text review and application of eligibility criteria. Following the full-text review, 15 studies were included in this review. The study types identified were: 7 (46.6%) case reports, 6 (40%) observational studies, 1 (6.6%) editorial comment, and 1 (6.6%) review article.

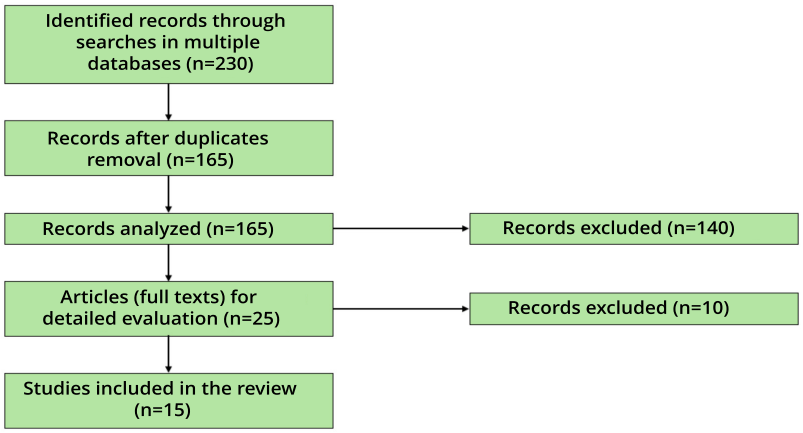

Figure 1. Study screening flowchart according to PRISMA-ScR.

Source: created by the authors (2024).

The technology of leadless pacemakers has emerged as a promising alternative for patients with CKD, particularly those undergoing hemodialysis. This review highlights both the benefits and challenges of this approach in a highly vulnerable population.

Leadless pacemakers offer several significant advantages over traditional transvenous pacemakers, particularly for patients with CKD undergoing hemodialysis. One of the main benefits is the preservation of vascular access, which is crucial for hemodialysis patients who often require central venous access for dialysis therapy. Afendoulis et al.[12] highlight the effectiveness of implanting a leadless pacemaker in a patient with no vascular access, emphasizing the ability of this technology to avoid strain on the central vessels, as detailed by Maradey, Jao, and Vachharajani.[13]

Moreover, leadless pacemakers tend to have a reduced profile of infectious complications. The study by Alshami et al.[14] showed that patients with end-stage renal disease using leadless pacemakers have a lower rate of infectious complications compared to those using traditional single-chamber pacemakers. This benefit is crucial for patients with chronic kidney disease, who are more prone to infections due to vascular access and immunosuppression.

However, despite the advancements, there are challenges associated with leadless pacemakers. Issues such as intermittent loss of capture and related complications, such as pericardial effusion, have been reported. Chong, Mar, and Hussein[15] reported episodes of capture loss in a patient undergoing dialysis therapy, while Hazwani et al.[16] documented pericardial effusion after leadless pacemaker implantation. These complications highlight the need for rigorous monitoring and appropriate postoperative management.

In addition, the study by Khan et al.[17] suggests that, despite the advantages, the implantation of leadless pacemakers in patients with CKD may be associated with procedure-related complications and adverse hospital outcomes. These findings highlight the need for well-defined implantation and follow-up protocols to mitigate risks.

Another aspect to consider is the interaction between leadless pacemakers and other technologies. Frazer et al.[18] investigated the interactions between leadless pacemakers, especially in patients who may have multiple implanted electronic devices, such as defibrillators or other leadless pacemakers. The study highlighted that the presence of more than one leadless device may lead to electromagnetic interference and challenges in synchronization between devices. These interactions can result in issues such as pacemaker malfunction, changes in capture, and even signal overlap, which can compromise the clinical effectiveness of the devices and patient safety. Therefore, a deeper understanding of these interactions and the implementation of strategies to minimize risks are essential, ensuring safe and effective integration of leadless pacemakers with other medical technologies.

This study has limitations. First, many of the included studies have a small number of patients, which may limit the generalization of the findings. Additionally, most of the included studies are observational in nature, which prevents a more granular assessment that establishes causal relationships. These limitations highlight the need for future research on the topic, with large-scale randomized clinical trials and extended follow-up periods, which would allow for a more accurate determination of the effectiveness and safety outcomes associated with the use of leadless pacemakers in patients with CKD.

Table 1 - Characteristics of the Articles

Authors	Country	Study type	Participants	Main objective	Key results	Conclusion
Alshami et al., 2023 [14]	USA	Retrospective	Not specified	Compare the incidence of infectious complications between leadless pacemakers and single-chamber pacemakers in patients with chronic kidney disease.	Leadless pacemakers showed a lower rate of uma menor taxa de infectious complications infecciosas em compared to single-chamber pacemakers.	Leadless pacemakers are preferable for reducing infections in patients with end-stage renal disease.
Boczar et al., 2024 [19]	Poland	Descriptive	1	Evaluate the effectiveness of implanting a leadless pacemaker with active fixation after the extraction of an infected device.	The implantation with active fixation was successfully performed after the extraction of an infected device, with no additional complications occurring.	Electrode-less pacemakers with active fixation can be an effective solution after device infections.
Chong, Mar e Husseim 2021 [15]	Not informed	Descriptive	1	Report intermittent capture loss in a hemodialysis patient after the implantation of a Micra pacemaker.	Intermittent capture loss was observed with the Micra pacemaker.	It is essential to have rigorous monitoring to manage capture loss in patients on hemodialysis.
Da Costa et al., 2017 [20]	Not informed	Review	Not specified	Discuss the advantages of leadless pacemakers as an alternative to transvenous devices.	Leadless pacemakers provide a valuable alternative to transvenous devices, especially in patients with venous access restrictions.	Leadless pacemakers are a promising alternative for patients with vascular access difficulties.

Authors	Country	Study type	Participants	Main objetive	Key results	Conclusion
Frazer, et al., 2023[18]	Not informed	Descriptive	Not specified	Investigate the interaction between leadless pacemakers and other implanted electronic devices.	It was identified that the presence of multiple leadless pacemakers can lead to electromagnetic interference and synchronization issues.	It is crucial to monitor and manage the interactions between leadless devices to prevent interference and malfunctions.
Hazwani et al., 2024[16]	Not informed	Descriptive	1	Report the occurrence of pericardial effusion following the implantation of a Micra pacemaker with temporary pacing electrodes.	Pericardial effusion was observed following the implantation of the Micra pacemaker, with the presence of temporary pacing electrodes.	Careful management is necessary to avoid complications such as pericardial effusion following pacemaker implantation.

Authors	Country	Study type	Participants	Main objetive	Key results	Conclusion
Hsu et al., 2020[21]	USA	Analytical	Not specified	Evaluate the feasibility of contralateral dialysis access in patients with leadless devices compared to transvenous devices.	Leadless pacemakers allow contralateral dialysis access, preserving the integrity of central vessels, which is not possible with transvenous devices.	Leadless pacemakers facilitate the preservation of vascular access for hemodialysis.
Khan et al., 2024[17]	USA	Analytical	Not specified	Study the complications and hospital outcomes associated with the implantation of leadless pacemakers in patients with chronic kidney disease.	Procedural complications and adverse outcomes were observed in the implantation of leadless pacemakers in patients with chronic kidney disease.	Implantation protocols should be carefully defined to minimize risks in patients with chronic kidney disease.

Authors	Country	Study type	Participants	Main objetive	Key results	Conclusion
Kusztal e Nowak, 2018[22]	Not informed	Descriptive	Not specified	Examine strategies to overcome vascular access issues in patients with implanted cardiac devices.	It was recommended to adopt strategies to ensure adequate vascular access for the implantation of cardiac devices.	Effective strategies are needed to address vascular access issues in patients with implantable devices.
Longacre et al., 2023[23]	USA	Comparative	Not specified	Compare the results between the Micra AV leadless pacemaker and dual-chamber transvenous pacemakers in patients with chronic kidney disease.	The Micra AV leadless pacemaker showed comparable or superior results to dual-chamber transvenous pacemakers in patients with chronic kidney disease.	Leadless pacemakers are an effective option compared to transvenous devices in patients with chronic kidney disease.

AV: Atrioventricular; USA: United States of America.
Source: created by the authors (2024).

CONCLUSION

This scoping review highlights that leadless pacemakers have emerged as an effective and safe alternative for managing cardiac conduction disorders in patients with chronic kidney disease (CKD) on hemodialysis, especially when compared to conventional devices. Their benefits include the preservation of vascular access and a significant reduction in infectious complications, which are crucial aspects for this population. However, the literature reveals ongoing concerns, such as intermittent capture loss and complications like pericardial effusion, which require rigorous monitoring and specific management strategies. Furthermore, the potential interaction with other electronic devices underscores the need for a better understanding and evaluation of possible interference. While leadless pacemakers offer notable advantages, existing gaps regarding safety in the peri- and early postoperative period highlight the importance of further studies to improve the application of these devices in CKD patients. These future investigations are essential to solidify the safety and efficacy of leadless pacemakers in this specific patient group.

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SCIENTIFIC ARTICLE - CASE REPORT

CONDUCTING GENETIC TESTING FOR ALPHA-1 ANTITRYPSIN DEFICIENCY IN SUS PATIENTS WITH COPD: AN EXPERIENCE REPORT

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ABSTRACT

Introduction: Alpha-1 antitrypsin (AAT) is a glycoprotein primarily synthesized by hepatocytes, acting as an inhibitor of neutrophilic elastase and protecting lung tissue from degradation. Alpha-1 antitrypsin deficiency (AATD) is a hereditary disorder transmitted in an autosomal codominant manner and associated with the SERPINA1 gene. This condition is strongly linked to the development and progression of Chronic Obstructive Pulmonary Disease (COPD), leading the WHO to recommend screening for AATD in all diagnosed patients. In Brazil, due to genetic admixture, the prevalence of AATD in COPD patients is similar to that observed in other countries. **Experience Report:** The study was conducted during the event "Saúde na Praça" in Goiânia on November 20, 2024, with genetic testing performed on patients with COPD diagnosed by spirometry. Smokers, former smokers, and non-smokers were included. Sample collection was performed using an oral swab (saliva), and the samples were sent for complete sequencing of the SERPINA1 gene. Patients provided contact information, and the results will be available within 90 days. The initiative also included medical guidance on AATD and its implications, highlighting that 90% of participants were unaware of the condition. **Final Considerations:** The genetic identification of AATD in COPD patients provides a new therapeutic approach, including AAT replacement therapy and preventive counseling for family members. Such initiatives promote education, innovation, and improvements in quality of life, while potentially reducing healthcare costs by preventing COPD complications.

Keywords: Alpha-1-antitrypsin (AAT), Alpha-1-antitrypsin deficiency, Chronic obstructive pulmonary disease (COPD), Genetic test, Genetic testing, COPD.

INTRODUCTION

Placenta Alpha-1-antitrypsin (AAT) is a glycoprotein primarily synthesized by hepatocytes (≥80%) and is also found in other sites such as the lungs, kidneys, and intestines. AAT is encoded by the SERPINA1 gene, located on the long arm of chromosome 14 (14q32.1).[1-4] It is also known as protease inhibitor (Pi), actively inhibiting neutrophil elastase, trypsin, and proteinase-3, thereby protecting

lung tissue from excessive proteolytic degradation of elastin as well as from external injuries, such as exposure to tobacco smoke.

Although AAT deficiency is a rare disorder, it is the most common hereditary disorder in adults, caused by a mutation in the SERPINA1 gene. This condition is inherited in a simple Mendelian manner, following an autosomal codominant pattern, with one allele inherited from each parent[5]. There are approximately 125 known variants of this gene, classified as normal, deficient, null, and dysfunctional.

The normal genotype Pi*MM is present in approximately 80–95% of the population and expresses 100% of serum AAT. The five main deficient genotypes (PiMS, PiSS, PiMZ, PiSZ, and Pi*ZZ) are found in the remaining 5–20% of the population and express 80%, 60%, 55%, 40%, and 15% of serum AAT, respectively.[2,3,5]

The strong relationship between COPD and AAT deficiency led the WHO to issue a 1999 recommendation advising that AATD screening be performed at least once in all patients diagnosed with COPD.[6]

Epidemiologically, AATD has a higher prevalence among Caucasians of European descent.[1,3] However, given the high rate of European immigration to Brazil and the resulting genetic admixture, a cross-sectional study conducted between 2011 and 2012—which gathered data from the five main centers across different regions of Brazil—found that the prevalence of AAT deficiency in COPD patients was similar to that observed in most other countries.[3]

In light of the above, through private initiative, genetic testing kits were donated for the detection of potential COPD patients who may not have received a diagnosis of AAT deficiency. These kits are designed for oral swab (saliva) testing.

Upon identifying patients with deficient genotypes, the possibility of treatment with augmentation therapy is considered, involving intravenous administration of alpha-1 proteinase inhibitor derived from human plasma. This approach also extends to providing genetic counseling for close family members.

The main objective of this report is to highlight the correlation between the development and progression of COPD and AAT deficiency.

The purpose of conducting genetic testing will be to create a database that will allow the identification of patients' genotypes, distinguishing them according to the degrees of AAT deficiency (from moderate to severe) and providing them with appropriate treatment based on their conditions.

In the future, it is anticipated that there will be a reduction in the number of hospitalizations due to exacerbations in this population of patients who have not only COPD but also AATD, leading to reduced healthcare costs and allowing for an improved quality of life.[7]

EXPERIENCE REPORT

The experience report took place at the event titled "Saúde na Praça," which occurred on November 20, 2024, in the city of Goiânia, GO. This event enabled the collection of material for conducting genetic tests to research AATD in COPD patients.

Patients with a documented COPD diagnosis through spirometry were selected. There were no limitations regarding age or diagnosis duration. The group included both current smokers, former smokers, and patients who had never been exposed to tobacco.

Genetic testing was conducted through saliva sample collection (oral swab) using appropriate

kits for storage. The samples were properly allocated and sent to a laboratory center. The complete sequencing of the SERPINA1 gene will be performed, and results are expected to be available within an estimated timeframe of up to 90 days from the date of submission. For the genetic test, patients with a COPD diagnosis based on spirometry were selected, without prior knowledge regarding the coexistence of AAT deficiency.

The patients who underwent the test filled out a form with personal data, including at least two phone numbers, physical address, and email address. The results obtained will later be made available to the medical team through a login and password.

On the same day, outpatient follow-ups were scheduled to allow for the delivery of the results.

The action carried out on the day of the sample collection involved not only the collection of samples by the attending resident doctors, but also provided an opportunity to offer guidance to patients regarding the potential outcomes.

Approximately 90% of the patients present were unaware of AAT deficiency and were able to receive updates during the action.

Future results will expand treatment options for the COPD population, as well as provide opportunities for genetic and behavioral counseling.

DISCUSSION

The initiative to conduct genetic testing for AAT deficiency screening in COPD patients is commendable, especially considering the strong correlation and coexistence of the two conditions. AAT deficiency has a high rate of underdiagnosis, primarily due to the underestimation of the previously known epidemiology. However, when considering Brazil as a country with high genetic admixture, studies have observed epidemiological rates similar to those found in European countries[3].

Knowing patients across a spectrum, in order to map them genetically, allows for the identification of the correct diagnosis. Additionally, it enables the extension of care to family members through genetic counseling and guidance aimed at minimizing exposure.

Treatment with exogenous AAT replacement (via injection) is a viable option for the population with AAT deficiency, as it impacts the progression of the disease[2,4,8].

Access to medication therapy is still limited by high costs. However, we have seen patients who acquired the treatment through legal channels, in collaboration with the Public Prosecutor's Office, with satisfactory results in preventing the progression of COPD.

FINAL CONSIDERATIONS

Placental COPD is a progressive disease, widely known for its complications and impact on the life of the affected patient[7]. With the advent of technological advancements that expanded diagnostic and investigative methods, it was observed that many COPD patients also had AAT deficiency, although this was diagnosed late.

With the detection and genetic mapping of this population, new possibilities in the care pathway can be accessed, thereby implementing injectable replacement therapy to slow the progression of the disease and also provide genetic counseling to family members. This action, in addition to being educational and innovative, represents an important step in combating the progression of COPD.

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SCIENTIFIC ARTICLE - CASE REPORT

RECONSTRUCTION OF THE DISTAL BICEPS TENDON WITH FLEXOR GRAFT: A CASE REPORT

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ABSTRACT

Chronic distal biceps injuries, which predominantly affect men between the ages of 40 and 60, account for approximately 3% of injuries to this muscle. These conditions are characterized by a duration of more than 4 weeks following the trauma and are often associated with factors such as degenerative tendinopathy and steroid use. They result in muscle atrophy and tendon retraction, making repair more complicated. When primary repair is not feasible, grafting techniques, such as the use of flexor tendons, are recommended. Repair with grafts and Endobutton presents an effective alternative for recovery in chronic cases.

Keywords: Tendon, Distal biceps, Chronic injuries, Graft, Endobutton.

INTRODUCTION

Chronic distal biceps injuries account for approximately 3% of injuries to this muscle, which is the primary supinator of the forearm, and are defined as injuries persisting for more than four weeks after trauma.[1] They most commonly affect the dominant limb in men aged 40 to 60 years during an eccentric contraction.[2] There is often an association with degenerative tendinopathy, endocrine disorders, mechanical impingement, and steroid use.[2] These injuries typically involve muscle atrophy, tendon retraction, and associated fibrosis, making repair a challenge.[3] In chronic cases, grafting techniques are employed, with options including the flexor tendons (semitendinosus), tensor fasciae latae, and palmaris longus, which are indicated when primary repair of the distal stump to its footprint is not possible, a common scenario in these injuries.[4]

CASE REPORT

This is a case of distal biceps tendon rupture in a 36-year-old man with an 11-week evolution, treated using a flexor tendon graft (semitendinosus) with a dual anterior approach fixation technique and endobutton use. The patient is a bodybuilding athlete, diagnosed through physical examination (positive Hook test and squeeze test) and imaging

(magnetic resonance imaging). The injury occurred due to an abrupt contraction following local trauma, despite not being the typical mechanism.

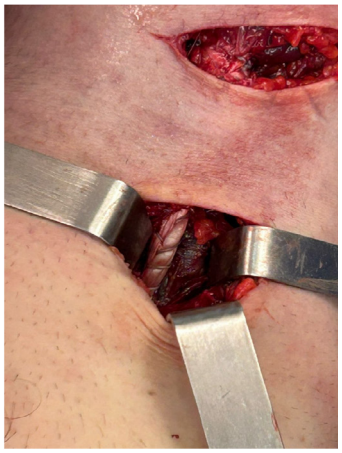

Figure 1: Result after suturing and graft insertion for the biceps.

Figure 2: Flexor graft used in the case.

DISCUSSION

The surgery was performed under general anesthesia with brachial plexus block and in a supine position with the use of a tourniquet. A 2.5 cm incision was made distal to the cubital crease, followed by dissection through layers according to Henry's technique, with the limb in maximum supination to locate the radial tuberosity and create the bicortical tunnel.[5] An additional incision was made 4 cm proximal to the crease for locating the retracted tendon stump and releasing the fibrous tissue. The semitendinosus graft was harvested and prepared at its insertion in the pes anserinus with the assistance of a knee surgeon. Krackow stitches were placed in the tendon stump along with the graft, reinforced by the Pulvertaft technique

at the myotendinous junction using high-strength sutures. The endobutton was passed and the graft tensioned (with the arm in 30 degrees of flexion) into the bicortical tunnel created at the radial tuberosity.[6] The technique proved effective, with no failure or loosening of the graft. A complication occurred with an initial wound dehiscence, which was resolved with dressing care. The patient progressed with full range of motion (flexion-extension and pronation-supination) within the first 3 weeks postoperatively, with no complaints of pain. Strength was similar to the contralateral side (grade 5 on the Medical Research Council scale), with good load progression during physical therapy and muscle strengthening exercises.

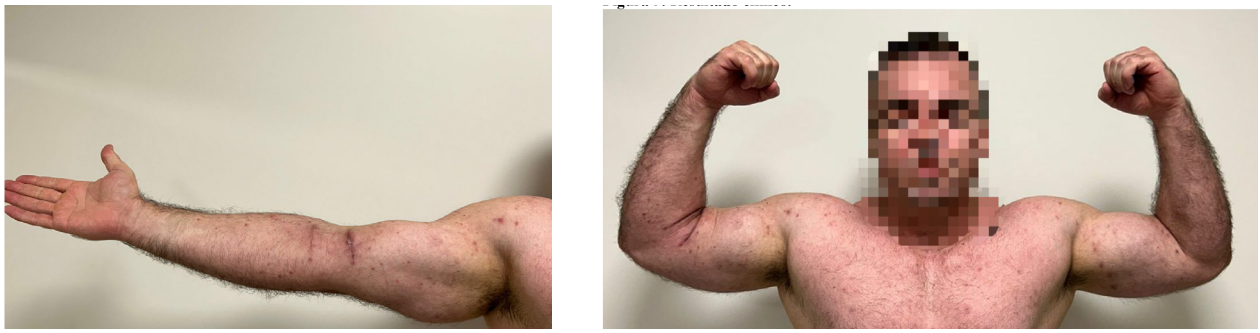

Figure 3: Clinical outcome.

CONCLUSION

Chronic distal biceps injuries lead to significant deficits in strength and mobility, especially in young individuals engaged in sports activities. Repair with a graft and Endobutton proves to be a viable and solid option for chronic distal biceps injuries with tendon stump retraction.

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