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CONTENTS

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ANAL CANAL ADENOCARCINOMA LOCALLY TREATED WITH ABDOMINOPERINEAL RESECTION AFTER CHEMORADIOTHERAPY: CASE REPORT AND REVIEW OF LITERATURE

Andreia Amado, Tatiana Queirós, Sílvia Dantas Costa, Amélia Tavares, Lurdes Gandra

ABSTRACT

Background: Primary adenocarcinoma of the anal canal is rare, representing less than 20% of anal canal cancers. Given the limited data regarding treatment and outcomes, the management of this type of cancer is focused on a combined modality therapy involving radical surgery and neoadjuvant/adjuvant chemoradiotherapy.

Case study: A 74-year-old woman presented with pruritus and anal pain with 6 months duration. MRI showed a semi-concentric mass in anal canal posterior wall. After an incisional biopsy that revealed an adenocarcinoma, the patient underwent neoadjuvant chemoradiotherapy followed by laparoscopic abdominoperineal resection.

Conclusion: There is limited research into anal adenocarcinoma since the rarity of this condition. The prognosis of anal adenocarcinoma is poor and the management remains controversial. Therapy strategies are not well established, however, general agreement states that a combined multimodality (combination of radical surgical resection and pre or postoperative chemoradiotherapy) achieves the best outcome.

Keywords: adenocarcinoma; anal; abdominoperineal resection; chemoradiotherapy

INTRODUCTION

Anal canal tumors account for approximately 2% of all cancers [1]. It is more common in woman and its incidence increases with age [2]. More than 60% of tumors of canal anal are histologically squamous cell carcinomas. Primary adenocarcinoma of the anal canal is a rare malignancy representing less than 20% of all anal canal cancers and many of these tumors represent rectal cancer with downward spread [1, 3]. The overall prognosis is poor. This type of cancer is thought to arise from the columnar epithelium of the anal canal including the mucosal surface, the anal glands, and the lining of fistulous tracts [4, 5].

Anal canal adenocarcinoma has a higher prevalence in the sixth decade and is similar in both genders. It is associated with human papillomavirus infection; a history of receptive anal intercourse or sexually transmitted disease; a history of cervical, vulvar, or vaginal cancer; immunosuppression after solid organ transplantation or HIV infection; hematologic malignancies; certain autoimmune disorders; and smoking. Risk factors also include anal Crohn's disease, and chronic fistula-in-ano [6].

The management and therapeutic approach of this rare type of cancer varies widely. It includes local excision, radiotherapy, chemotherapy, chemoradiotherapy, sphincter-sparing salvage therapy and abdominoperineal excision. Distant metastases are more common in adenocarcinoma of the anal canal than with other primary anal tumors. Superficial inguinal, deep pelvic and abdominal lymph nodes may be involved and could limit surgical indication [7]. This decision should entail a multidisciplinary discussion and clinical course of the patient and lesion.

MATERIAL AND METHODS

Clinical file review at our Hospital Center and concordant literature through PubMed/Medline database. We used the keywords: “adenocarcinoma”, “anal canal”, “abdominoperineal resection” and “chemoradiotherapy”.

CASE STUDY

A 74-year-old woman presented with pruritus and anal pain with 6 months duration. There were no complaints of rectal bleeding during defecation. On anoscopic examination, a mass was felt occupying half of the circumference (posterior) in the canal anal, with extension to anal margin, measuring 3 cm in length. Pelvic Magnetic Resonance Imaging (MRI) showed a mass lesion with 31x27x24 mm, between 3 and 9 o´clock, occupying nearly 180º in the posterior wall of the anal canal, involving both internal and external sphincters (Figure 1). No signs of extension into ischiorectal or ischioanal fossae were evidenced. The rectum did not show any tumor.

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A thoraco-abdominopelvic Computerized Tomography (CT) was performed to complete staging and no distant metastasis were found. According to 8th edition of the AJCC cancer staging manual, the tumor was staged as a cT2 N0 M0 (stage IIA). Her hemogram, liver, and kidney function tests were within normal limits, with tumor markers slightly above normal parameters. The patient was submitted to an incisional biopsy that revealed to be an adenocarcinoma of the anal canal. After a multidisciplinary discussion of the case, it was proposed a short course of neoadjuvant chemoradiotherapy in order to reduce the mass volume and downstage the carcinoma. The regimen planned included capecitabine plus 45 Gy in 25 fractions, 5 times/week (1 fraction/ day in pelvis and inguinal sites according to Volumetric Modulated Arc Technique). Three months after the end of oncologic medical treatment, a re-staging pelvic MRI was performed, revealing lesion reduction in the posterior wall of rectal-ano transition, with extension to the internal but not the external sphincter (Figure 2). Tumor regression was classified as grade 2 (partial response).

The treatment was, then, followed by laparoscopic abdominoperineal resection (APR). Radical surgery was carried out with perineum skin resection. The histological analysis of the specimen resected indicated an adenocarcinoma of the anal canal with invasion of the pericolic fat tissue (pT3N0), whereas there was no evidence of disease in local lymph nodes. The postoperative course was uneventful and the patient was discharged on the 8th post-surgery day. Six months after, the patient performed a pelvic MRI and a CT scan that revealed pelvic recurrence with invasion of the vagina and vulva. The patient was proposed for palliative chemotherapy with irinotecan plus cetuximab.

DISCUSSION

The anal region is comprised of the anal canal and the perianal region. The definition of anal canal cancer, based on the 8th edition of the AJCC cancer staging manual states them as tumors that develop from mucosa that cannot be entirely seen when the buttocks is gently pressed[8]. Histologically, the mucosal lining of the anal canal is predominantly formed by squamous epithelium and its margin is lined with skin. The anatomical anal canal begins at the anorectal ring and extends to the anal verge. Functionally, is defined by the sphincter muscles. The superior border is delineated by the palpable upper border of the anal sphincter and puborectalis muscles of the anorectal ring with 3-5 cm in length, and the inferior border starts at the anal orifice [9]. This definition is important when radical surgical treatment is considered. According to World Health Organization, there are 3 types of anal canal adenocarcinoma: those whose origin includes the upper portion of the anal canal, those that derive from anal glands or ducts and those associated with chronic anorectal fistulas [10, 11].

Patients diagnosed with anal canal adenocarcinoma usually present with advanced disease, distant metastasis e, consequently poor survival rates comparing to squamous tumors[12, 13]. Clinical presentation of anal cancers varies between fistulas, abscesses, rectal bleeding, in approximately 45% of patients and anal pain or sensation of a rectal mass in 30% of the cases. National Comprehensive Cancer Network (NCCN) guidelines recommend a careful clinical history and physical observation including anoscopic examination, palpation of the inguinal lymph nodes, fine needle aspiration and/or excisional biopsy of enlarged nodes. Before treatment, a PET/CT scan and pelvic MRI is needed to provide information about tumor staging. Final diagnosis is, only, stablished with a biopsy or histological analysis [14]. Most adenocarcinomas in the anal canal are rectal carcinomas that have spread distally or arise above the dentate line through the rectal mucosa. The distinction between an anal canal or rectal adenocarcinoma with distal spread is very difficult. It involves the pattern of local growth and its dual lymphatic drainage, carrying a high risk of metastasis in inguinal and femoral lymph nodes than adenocarcinomas of the rectum. In our case, the patient did not present with enlarged lymph nodes that could lead to a worse prognosis due to high risk of distant metastasis. Fortunately, the diagnosis was made in an early stage (stage IIA).

There are few studies in what concerns anal canal adenocarcinoma and it shows that does not exist a well stablish treatment protocol [7, 13]. Historically, many authors recommended abdominoperineal resection as the treatment of choice for this type of cancer. Existing retrospective multicentric studies revealed combined therapy with chemoradiotherapy and local excision as the best choice for these patients, reserving APR as a salvage treatment. There is no standard protocol for anal canal adenocarcinoma treatment nor European guidelines for its management [15]. Nevertheless, currently, the advisable therapy for T2/3 N0 M0 carcinomas is neoadjuvant chemoradiotherapy followed by radical surgery, considering adjuvant treatment in micrometastases prevention. Chemoradiotherapy alone should be reserved for patients not fit to surgery or regional metastatic lymphadenopathy. Novel techniques such as robotic and microsurgery are promising since they enable a precise dissection in the pelvis and can minimize morbidity. However, these have a wide learning curve and are still under development [16].

Therapeutic management of our patient was conducted according to existing literature [11]. In our case, a multidisciplinary team involving surgeons, oncologists and radiologists decided our patients' treatment should associate primary chemoradiotherapy and surgical resection. The discussion of all possible options, mainly

in initial stages, is essential to guarantee the best quality of life. APR was performed without complications. Unfortunately, the patient showed pelvic recurrence in 6-months follow-up exams. The overall prognosis is poor. Adenocarcinoma of the anal canal often requires multimodality therapy to achieve better overall survival rates (disease-free and 5-year overall survival rates of 54% and 58%, respectively) [17]. Recurrence rates after combined treatment are observed in nearly 20% and depend on several factors such as tumor grade [15].

Further research and publication of more clinical cases of this rare entity is required for development and uniformity of treatment strategies.

CONCLUSION

The prognosis of anal carcinoma is based on the size of the primary tumor and the presence of lymph node metastases. It is usually poor, and research into this type of cancer is limited by its rarity. Therefore, there is little information on the optimal management. Relevant studies show that a multimodality approach combining radical surgical resection and neoadjuvant/adjuvant chemoradiotherapy offers the best chance of survival.

CONFLICT OF INTEREST:

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Ethics approval and informed consent: The patient agreed to publish the clinical case.

Authors' contributions: All authors that made substantial contributions to conception and design, and/or acquisition of data, and/or analysis and interpretation of data. All authors that participated in drafting the article or revising it critically for important intellectual content. All authors gave final approval of the version to be submitted and any revised version.

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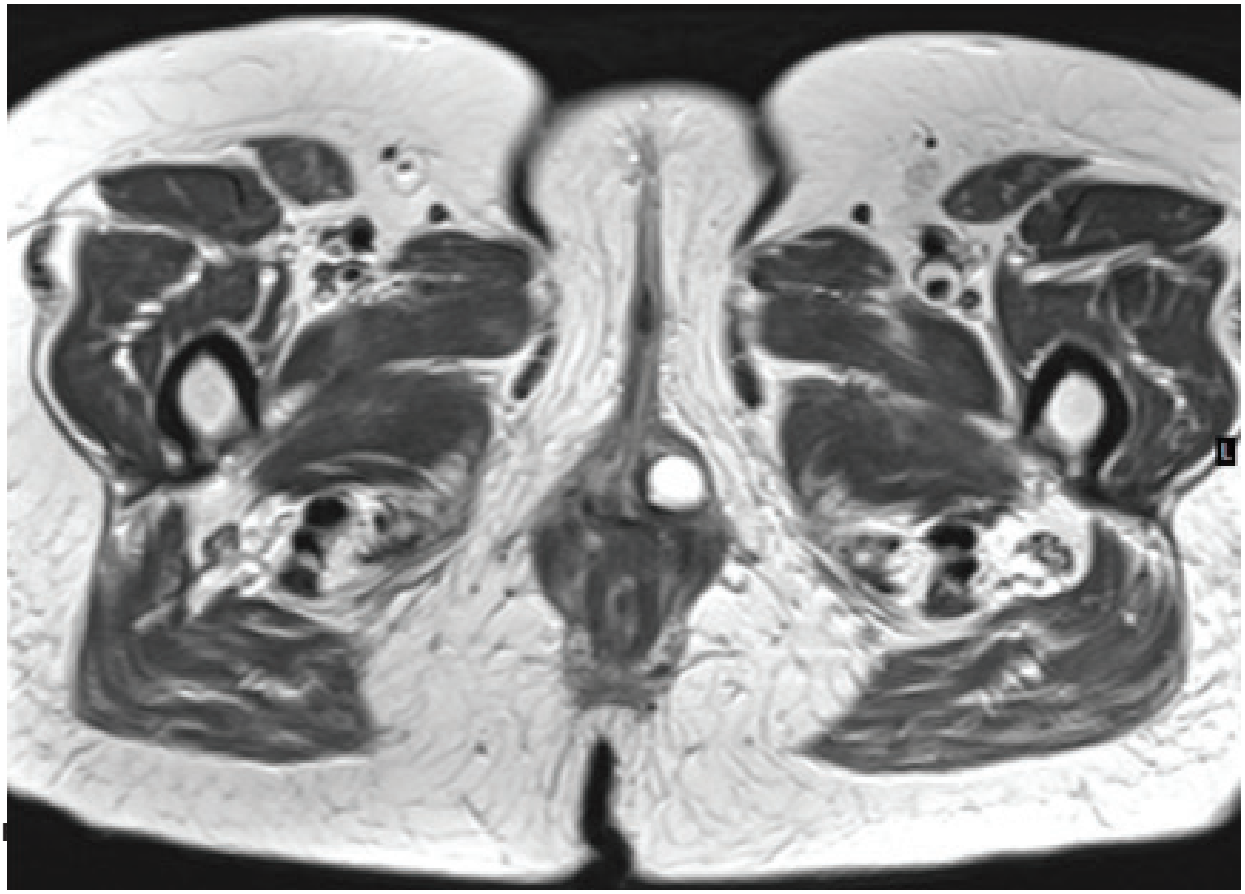

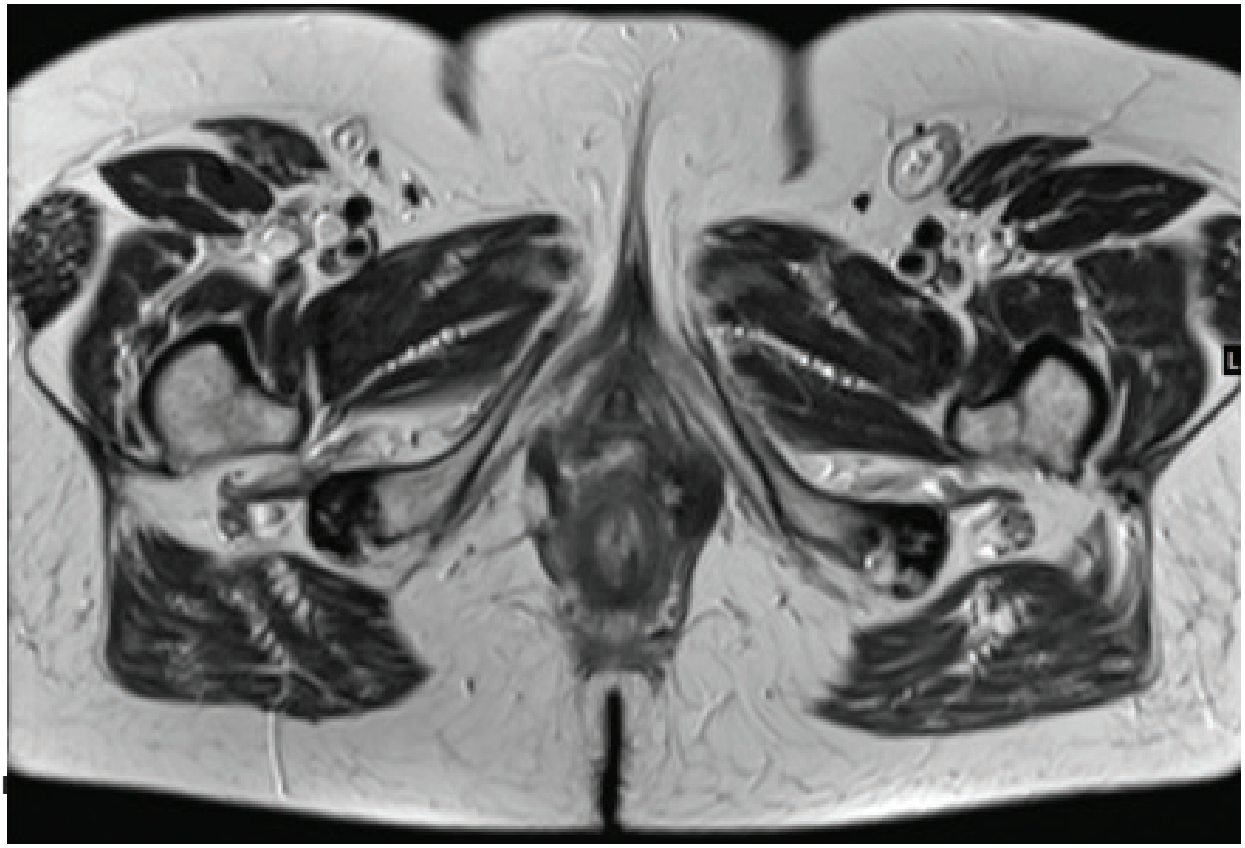

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A RARE CASE OF COLON PERFORATION COMPLICATING A VETRICULOPERITONEAL SHUNT WITH TRANS-ANAL PROTRUSION

Asmir Jonuzi[1], Sadeta Begic[1], Zlatan Zvizdić[1], Kenan Karavdić[1], Nusret Popović[1], Emir Milišić[1], Amira Mešić[2], Verica Mišanović[3], Ibrahim Omerhodzic[4]

ABSTRACT

Background: Ventriculoperitoneal (VP) shunt placement is an effective treatment of hydrocephalus diverting the cerebrospinal fluid into the peritoneal cavity. Colon perforation and spontaneous extrusion of the lower end of the tube through the anal opening is a rare and unusual complication of the ventriculoperitoneal shunt.

Case study: We report a case of 11 years old girl with the shunt tubing protruding through the anus associated with spontaneous colon perforation. This complication occurred 10 years following insertion of ventriculoperitoneal shunt for congenital hydrocephalus. There were no signs of meningitis and mild tenderness present over abdomen. At laparotomy the tube was seen to enter the descendens colon and was encapsulated by the greater omentum. The tube was cut and the distal end removed via the anus. The descendens colon was repaired. The catheter continued to function effectively and the patient remained asymptomatic.

Conclusion: Colon perforation and transanal extrusion of VP shunt catheter is a rare but serious problem.The results of abdominal complications of VP shunts are excellent when diagnosed and treated early.

KEYWORDS: colon perforation, hydrocephalus, ventriculoperitoneal shunt

INTRODUCTION

The ventriculoperitoneal (VP) shunt has become a popular operation to achieve cerebrospinal fluid (CSF) diversion. It is relatively simple and safe procedure. It can be safely performed early in infancy and is associated with low revision and low complication rate [1]. Several rare late abdominal complications can occur, however, including intestinal volvulus, pseudocyst and extrusion through the scrotum, umbilicus, vagina or gastrointestinal tract [2,3]. Spontaneous bowel perforation is a rare complication of VP shunt, where it can occur anytime, ranging from few weeks to several years after the insertion of the device in 0.01% to1% of patients [4]. It can present with a wide range of manifestations starting from being asymptomatic in up to 50% of the cases, to the extent of developing serious infectious complications, sepsis or even death [2]. Therefore, a high index of suspicion is needed for the early recognition and prompt management of the colonic perforation and its ominous complications [5]. In this study, we report a case of a 11 year old girl with a VP shunt catheter migrating into the colon and protruding through the anus 10 years after its placement.

CASE STUDY

A 11 years old girl had undergone the right sided VP shunt procedure 10 years ago as a treatment of congenital hydrocephalus. She presented to us with complaint that the child protruded a white tube per anus on defecation for past 6 hours (Figure 1). On examination, the child was alert, afebrile and had no neck rigidity. There were no other signs of meningitis. She denied nausea, vomiting, melena, hematochezia,urinary urgency, frequency and hematuria. There was mild tenderness present over abdomen. On rectal examination, there was white tube coming from rectum. Total leukocyte count was 9,84/109/L with neutrophils at 35,42%, CRP 9,2 mg/L. Abdominal ultrasound was suggestive of minimal perisplenic collection. Plain abdominal radiographs showed the distal part of the catheter within the colonic lumen and through the descending and sigmoid colon and the rectum. There was no free air in abdominal cavity under diaphragm (Figure 2). Laparotomy confirmed that the distal part of the peritoneal catheter had perforated row descending colon with presence of abundant chronic fibrous tissue around the point of perforation (Figure 3). We consulted a neurosurgeon preoperatively and intraoperatively, and his opinion was not to remove the VP shunt if the child's

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clinical condition is normal. This part of the catheter was then removed through the anus, the fibrous tissue was excised and a primary two-layer closure of the colonic perforation was performed. The patient received intravenous antibiotics (ceftriaxonum, amikacinum and metronidazolum) for 7 days. The cerebrospinal fluid (CSF) was clear and colorless, while the laboratory examination and the cultures were negative for infection with analysis from catheter.Three days after the operation, oral intake was started, and patient discharged on 8th post-operative day with uneventful recovery. Patient was followed for one year, without reporting any complains regarding the operation. The catheter continued to function effectively.

DISCUSSION

The term hydrocephalus is derived from the Greek words "hydro" meaning water and "cephalus" meaning head. As the name implies, it is a condition in which the primary characteristic is an excessive accumulation of fluid in the brain. Shunt remains the most common procedure done for hydrocephalus. VP shunt is associated with a complication rate of 24–47%, of which mechanical blockage of the shunt is most common [6]. The risk of abdominal complication associated with VP shunt is 25%, and incidence of bowel perforation with protrusion of VP shunt per anus is 0.1–0.7% [7,8]. Bowel perforation is a rare but serious complication of VP shunt surgery. It has high mortality rate around 15% It is very important to identify this unusual serious complication as it carries a risk of ascending infection to the brain in the form of meningitis, encephalitis, or brain abscess [9]. Though several mechanisms have been proposed, the etiology of the bowel perforation after VP shunt surgery is not fully understood. Local inflammatory reaction or fibrosis surrounding the distal catheter is believed to have an anchoring effect on the tube resulting in pressure on an area of the bowel, and subsequently causes perforation of the wall [10]. The length of the intra-abdominal part and a type of the catheter may also be implicated in the bowel perforation and lastly, a foreign body-like reaction as a result of silicon allergy. The use of softer, more flexible silastic tubing has led to a reduction in incidence but not elimination of this complication [2]. The duration of time between VP shunt surgery and detection of bowel perforation was found minimum in infant and increasing with age [2]. The absence of peritoneal signs is usual in cases of bowel perforation by a VP shunt. Less than 15-20% of reported cases with demonstrated bowel perforation had an associated clinical peritonitis. But 43-48% of reported cases developed meningitis or ventriculitis [11]. Escherichia coli is the most common organism in CSF cultures [2]. Any patient with a VP shunt who present with ventriculitis or meningitis due to an enteric organism should be assessed for bowel perforation. Prolonged diarrhea of unknown etiology and abdominal symptoms should serve as warning signs of possible bowel perforation. Children with meningo myelocoele and congenital hydrocephalus may be more susceptible to developing perforation due to weakness in the bowel wall resulting from deficient innervation. In case of oral extrusion the site of perforation may be stomach followed by jejunum, while in case of anal extrusion the site of perforation may be caecum, ascending colon, transverse colon, splenic flexure, descending colon, sigmoid colon [12]. The diagnosis is obvious in patients presenting with spontaneous extrusion of a whitish tube while defecating through which clear fluid dripped. If there is significant abdominal infectious pathology such as peritonitis or abscess, the fistulous opening may not closed spontaneously then laparotomy should be performed and primary closure of bowel with lavage should be done. The exact pathogenesis of shunt tube-related organ perforation and protrusion though anus is unclear. It has been proposed that continuous mechanical irritation at a fixed point on the bowel surface by the abdominal catheter may induce bowel perforation, causing distal catheter end to pass through the intestines, and exiting through the anus [13,14]. As probably in the present case, younger patients have weak intestinal wall musculature and stronger peristaltic activity than older patients [13]. The additional continuous water hammer effect of the cerebrospinal fluid pulsations can make the hard tipped distal end catheter to penetrate the intestinal walls and eventually perforate the viscus [15]. Early diagnosis and prompt attention is advisable to recognize this complication as ascending infections can cause ventriculitis, meningitis, and ultimately sepsis by migrating intestinal flora through the catheter and its sheath [13]. Approximately one-fourth of these complications are intestinal volvulus, peritoneal pseudocyst, catheter penetration to the visceral organs, or protrusion through rectum, vagina, or urethra. Sometimes it can also penetrate the abdominal wall [16,17]. Spontaneous bowel perforation is a rare complication of VP shunt surgery, occurring in only 0.01%-0.07% of cases; however, the mortality rate, which is due to intracranial or intraabdominal infections, is considerably high at about 15% of all such reported cases [18]. It has been noted that among the reasons for migration, the length of the abdominal catheter, trauma during the operation, age, fibrous adhesion, and infection must be taken into consideration [19]. The treatment of a VP shunt perforating the bowel is a medical emergency. The perforating part of the catheter must be removed and an external drainage of the proximal part is needed together with antibiotic prophylaxis. In general, there are three methods by which the catheter can be removed: by pulling it through the anus, by endoscopic removal, or by surgical removal. Nevertheless, the management of the bowel perforation must be individualized. The shunt is externalized at its upper end and, once the CSF cultures are negative, a new peritoneal shunt catheter can be placed intra-abdominally few weeks later. If there is no accompanying peritonitis or abdominal abscess, then percutaneous or endoscopic removal of the abdominal shunt catheter can be performed without surgery [2,17,20]. The fibrous tissue surrounding the perforation does not permit the spillage of bowel contents into the peritoneal

cavity. Laparotomy must be performed in cases of intra-abdominal infection (peritonitis or abscess) or when the fistulous tract does not close spontaneously after percutaneous or endoscopic removal [11,21,22].

CONCLUSION

Colon perforation and transanal extrusion of VP shunt catheter is a rare but serious problem. The results of abdominal complications of VP shunts are excellent when diagnosed and treated early. Clinicians managing patients with VP shunt must be familiar with its possible complications and be aware for early recognition of the bowel perforation in such patients, especially in asymptomatic cases without protrusion of the catheter through the anus.

CONFLICT OF INTEREST:

The authors declare that there is no conflict of interest.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms.

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FIGURES

Figure 1. Peritoneal end of ventriculoperitoneal shunt protruding from the anus.

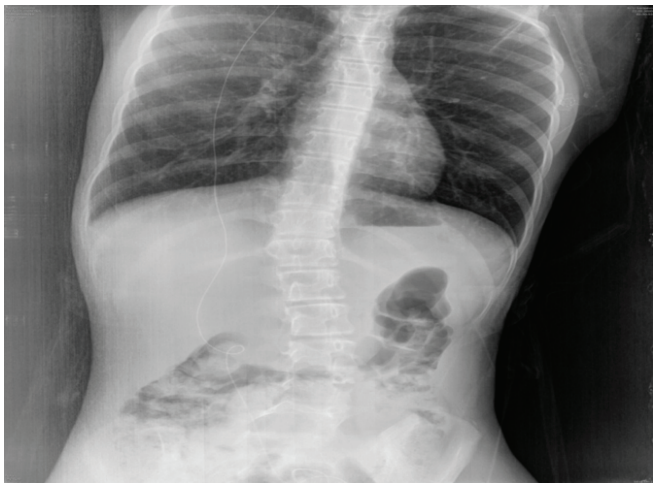

Figure 2. Plain abdominal radiography showing the distal part of the catheter within gastrointestinal (GI) tract.

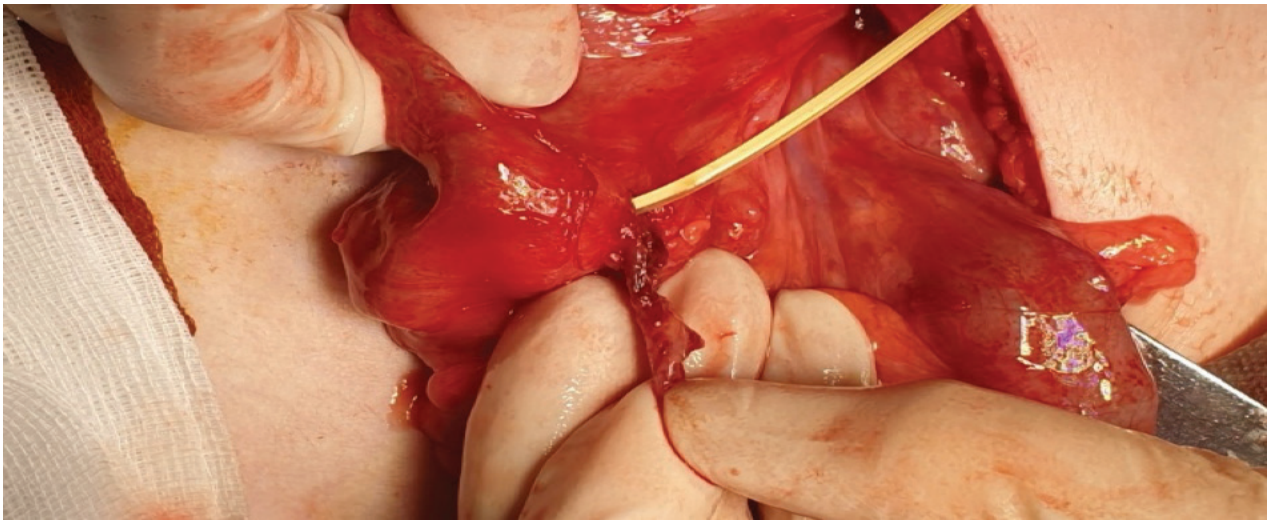

Figure 3. Laparotomy view: the distal part of the ventriculoperitoneal shunt catheter penetrating the descendens colon.

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ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION WITH ANTEROLATERAL STABILIZATION BY A MODIFIED LEMAIRE TECHNIQUE IN ADOLESCENT PROFESSIONAL FOOTBALL PLAYER: A CASE REPORT

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ABSTRACT

Background: Anterior cruciate ligament (ACL) tear is one of the most common injuries in professional athletes. Additional procedures, such as anterolateral ligament reconstruction and lateral extra-articular tenodesis attempt to reduce rotational instability, the most common cause of re-injury in patients with a non-isolated ACL tear.

Case study: A 17-year-old professional football player suffered a right knee injury in a direct hit to the lateral side of the knee. Magnetic resonance imaging showed anterior cruciate ligament tear and lateral knee structures soft tissue contusion. Due to the injury of the lateral structures and the increased risk of ACL re-rupture, it was decided to perform ACL reconstruction with additional anterolateral stabilization by a modified Lemaire technique without additional screw fixation in the area of the lateral femoral epicondyle, which could damage the epiphyseal plate and, concurrently, impair bone growth.

Conclusion: The addition of lateral extra-articular tenodesis by a modified Lemaire technique prevents rotational instability in a patient with expressed pivot-shift before the surgery, without overconstraint of the knee and additional damage to the epiphyseal plate.

KEYWORDS: anterior cruciate ligament reconstruction, lateral extra-articular tenodesis, Lemaire procedure, professional football player

INTRODUCTION

PAnterior cruciate ligament (ACL) tear is one of the most common injuries in professional athletes [1]. Ever since arthroscopic ACL reconstructions using autologous tendon grafts have first been performed, operative techniques were improving so that the reconstructed ACL has a function as close as possible to the native ACL. Nevertheless, recurrent ruptures of the reconstructed ACL are a problem especially in professional athletes who are expected to continue the sport at the top level after surgery and rehabilitation [2].

Residual rotational instability after ACL reconstruction is one of the most common causes of re-injury. It is common in patients who, in addition to ACL rupture, have damage to other knee structures such as meniscus root tear, anterolateral ligament and distal Kaplan fiber sectioning, collateral ligament injury, posterolateral and posteromedial knee angle injury [3]. For this reason, patients with injury to other knee structures often undergo additional anterolateral stabilization by anterolateral ligament reconstruction or lateral extra-articular tenodesis (LET) to attempt to reduce internal tibial rotation and anterior tibial translation [4].

Another demanding group of patients to perform ACL reconstruction are pediatric patients with open epiphyseal plates in whom surgery and fixation of the ACL or LET graft in the area of the growth plate could cause lower extremity length discrepancies [5]. Furthermore, almost every fourth young athlete with an ACL injury who returns to a risky sport will get another

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ACL injury at some point in their career, most often in the early days of returning to the game [2].

Here, we present a case of a 17-year old patient who underwent anterior cruciate ligament reconstruction with a quadruple semitendinosus tendon with anterolateral stabilization with LET by a modified Lemaire technique without additional screw fixation in the area of the lateral femoral epicondyle.

CASE STUDY

A 17-year-old professional football player suffered a right knee injury by a direct hit to the lateral side of the knee. After the next injury, when playing football again, swelling occurred. During the clinical examination, the positive Lachmann test and positive Jerk test were verified. Joint laxity and hypermobility, proven by the Beighton hypermobility score (9/9), were also dominant (Figure 1). Magnetic resonance imaging showed anterior cruciate ligament tear and lateral knee soft tissue structures contusion. Due to the injury of the lateral structures and the increased risk of ACL re-rupture, it was decided to perform ACL reconstruction with additional anterolateral stabilization with the modified Lemaire technique.

The patient was placed in a supine position on the operating table in spinal anesthesia. Before the start of the operation, another clinical examination was performed. After arthroscopy through standard anteromedial and anterolateral portals confirmed ACL rupture, an additional vertical incision was made to take the semitendinosus tendon for ACL graft preparation (Figure 2). The tendon was processed at the station to model a quadruple ACL graft 65 mm long, 9 mm wide distally (tibial side) and 8.5 mm proximally (femoral side). Muscle tissue remnants have been preserved on the graft as described in the study Ćuti and colleagues [6] (Figure 3). Also, an incision was made above the distal part of the iliotibial band and the middle part of the band was taken, approximately 6 mm in diameter and 10 cm in length (Figures 4-6). The bundle of the iliotibial band was dissected to Gerdi's tubercle and proximally whipstitched (Figure 7). The bundle was pulled below the lateral collateral ligament and the site of fixation proximal and dorsal to the lateral epicondyle was marked after the X-ray control, to avoid drilling through the epiphyseal plate (Figures 8-9). Through the anteromedial portal, a femoral tunnel 30/23 was placed on the prepared marking with an 8.5 mm FlipCutter® Drill (Arthrex) using an outside-in guide (Figures 10-12). The tibial tunnel for ACL reconstruction was placed in a preserved ACL stump using a 30/9mm FlipCutter® Drill (Arthrex) at an angle of 55 degrees. The anterior cruciate ligament was reconstructed by the prepared semitendinosus graft with the All-inside technique. The graft was fixated proximally and distally with TightRope® RT Graft Fixation Implant (Arthrex) in 30 degrees of flexion (Figure 13). The prepared bundle of the iliotibial tract was passed under the lateral collateral ligament and was fixed in 70 degrees of flexion by the "button" of femoral TightRope® RT Graft Fixation Implant in neutral rotation (Figure 14). Arthroscopically, good tension and stability of the graft and the absence of impingement in the extension were proven (Figure 15). The X-ray showed a good position of tunnels and fixation implants (Figure 16). The wounds were thoroughly washed, drainage was placed, and the wounds were sutured in layers and bandaged (Figures 17-18).

On the first postoperative day, the drainage was removed, the patient was mobilized and discharged from the hospital for home treatment. The patient's right leg was placed in a brace locked in extension for one week, consecutively opened for a range of motion from 0 to 90 degrees during physical therapy for the first 4 weeks after surgery.

The patient came for follow-up assessment two weeks and one month after the operation, after which the crutches were gradually discarded. Additional physical therapy was requested in terms of continuing to strengthen the hamstrings, adductors and the medial head of the quadriceps muscle. Three months after the surgery, the patient was without knee pain and swelling, and clinical examination showed normal knee stability and mobility.

DISCUSSION

According to the International Anterolateral Complex Consensus Group, indications for adding the LET to ACL reconstruction procedure are revision ACL reconstruction, high-grade pivot shift, generalized ligamentous laxity or genu recurvatum of more than 10 degrees, and young patients returning to pivoting activities [7]. Since our patient was a 17-year-old presenting with pivot-shift and ligamentous laxity proven by the Beighton hypermobility score (9/9), it was correct to perform additional anterolateral stabilization by a modified Lemaire technique. Furthermore, the patient had MRI confirmed contusion of lateral knee soft tissue structures. If left untreated, anterolateral complex injuries can lead to residual anterolateral rotational instability after ACL reconstruction, which can jeopardize ACL reconstruction outcomes and increase the risk of graft rupture or subsequent meniscus injury, especially in patients returning to exercise or sports activity [7,8]. Besides, secondary ACL injury in young athletes returning to sport is 30 to 40 times more common than primary ACL injury in hitherto uninjured young athletes [2].

Biomechanical studies have shown that LET, as an adjunct to ACL reconstruction, reduces anterior tibial translation and anterolateral rotational instability, with reduced force on the graft itself when anteriorly directed loading is applied [4,8–10]. Thus, LET protects the ACL graft in the postoperative period. ACL reconstruction with a modified Lemaire procedure for knees with

rotational instability allows for equivalent isokinetic muscle recovery as well as stand-alone ACLR in knees without rotational instability [8]. Therefore, adding LET to standard ACL reconstruction provides additional stability without compromising isokinetic muscle recovery at the time of return-to-play.

Compromised limb growth after ACL reconstruction in children is not given enough attention and the same problems are insufficiently reported, which is why the knowledge on the topic is insufficient [5]. Although there are no concrete conclusions and guidelines on this issue, according to a systematic review by Gupta et al., the all-epiphyseal ACL reconstruction technique can achieve good postoperative functional outcomes while minimizing the risk of the growth plate disturbance and potentially related discrepancies in leg length [11]. In addition to trying to compromise the growth plate as little as possible with this ACL reconstruction technique, we have also performed a modified Lemaire technique of lateral extra-articular tenodesis. By suturing the iliotibial bundle for the "button" of femoral TightRope® RT, we avoided additional fixation that would further damage the growth zone (Figure 14).

The limitation of this case report was the short follow-up period of the patient. Nevertheless, the main goal of this article was to present a new anterolateral stabilization technique that does not use additional fixation methods that could damage the growth plate. Also, a follow-up period of three months was sufficient to show satisfactory stability without overconstraint of the knee.

CONCLUSION

The addition of LET by a modified Lemaire technique prevents rotational instability in a patient with expressed pivot-shift before the surgery, without overconstraint of the knee and additional damage to the epiphyseal plate, if the iliotibial bundle is sutured to "button" of femoral TightRope® RT.

CONFLICT OF INTEREST:

The authors declare that there is no conflict of interest.

The patient and his mother gave their informed consent prior to the patient's inclusion in a case report.

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FIGURES

Figure 1. Knee hyperextension is one of the landmarks of joint laxity and hypermobility (Beighton score), which was seen in physical examination right before the surgery.

Figure 2. Semitendinosus tendon harvesting for an anterior cruciate ligament graft.

Figure 3. Quadruple semitendinosus graft for all-inside anterior cruciate ligament reconstruction with preserved muscle tissue remnants.

Figure 4. Surgical landmarks on the lateral side of the knee, showing Gerdy's tubercle, the fibular head, and the lateral femoral epicondyle together with planned incision for iliotibial band bundle preparation.

Figure 5. Incision above lateral epicondyle for iliotibial band dissection.

Figure 6. A bundle of iliotibial band dissected for anterolateral knee stabilization by a modified Lemaire technique.

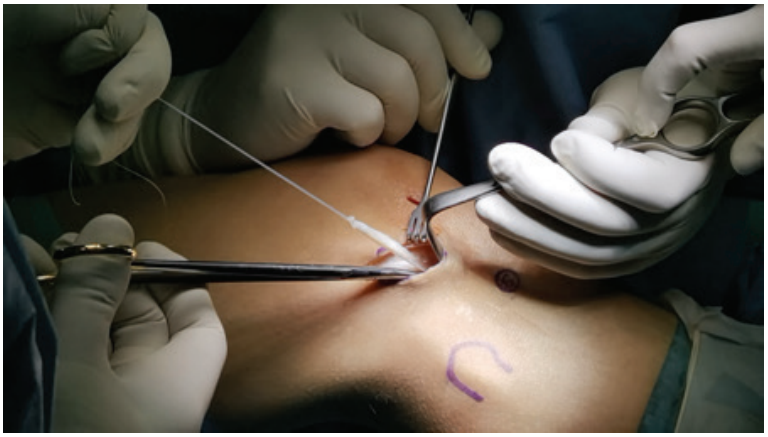

Figure 7. Proximally sutured dissected bundle of the iliotibial band for anterolateral knee stabilization by a modified Lemaire technique.

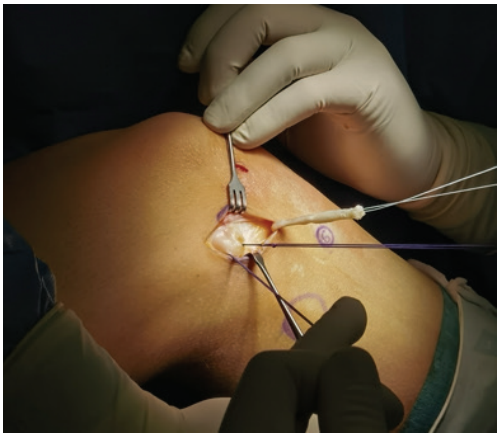

Figure 8. Pulling the bundle of the iliotibial band under the lateral collateral ligament.

Figure 9. X-ray controlled placing the guidewire below the femoral epiphyseal plate to avoid drilling the femoral tunnel, for anterior cruciate ligament reconstruction, through the epiphyseal plate

Figure 10. Preparing the femoral tunnel for anterior cruciate ligament reconstruction with the FlipCutter® Drill (Arthrex) using an outside-in guide.

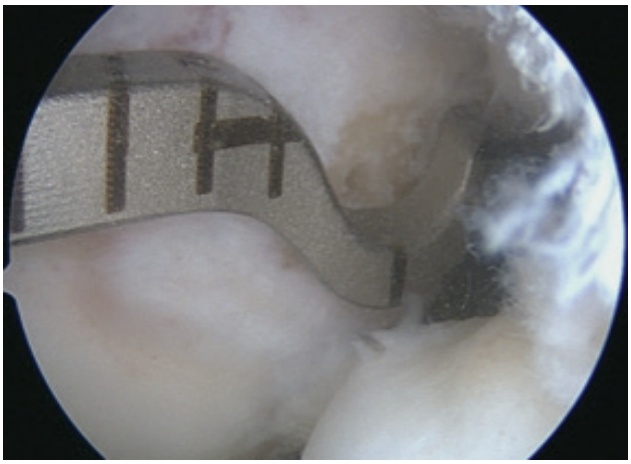

Figure 11. Joint-side femoral tunnel localization using an outside-in guide for the reconstruction of the anterior cruciate ligament.

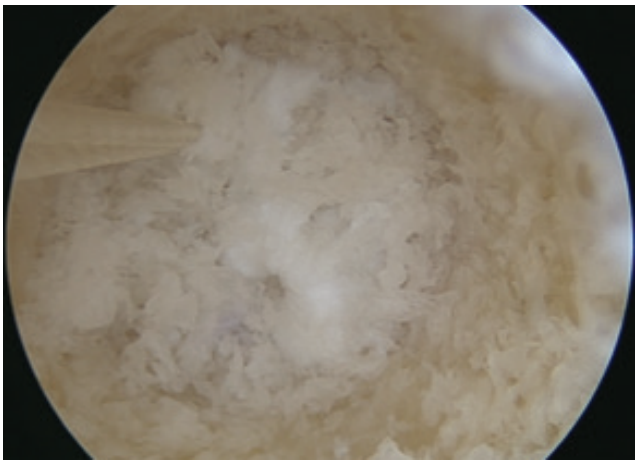

Figure 12. Femoral tunnel for anterior cruciate ligament reconstruction without involving the epiphyseal plate.

Figure 13. TightRope® RT (Arthrex) "button" fixation on the femoral epicondyle.

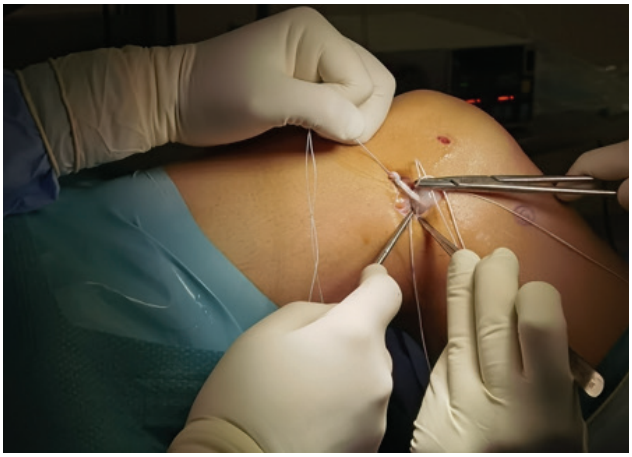

Figure 14. Fixating the iliotibial band bundle for the TightRope® RT (Arthrex) "button" on the lateral femoral epicondyle after anterior cruciate ligament reconstruction presents an anterolateral knee stabilization method that doesn't involve additional fixation implants which could damage the epiphyseal plate in the pediatric population and young adolescents.

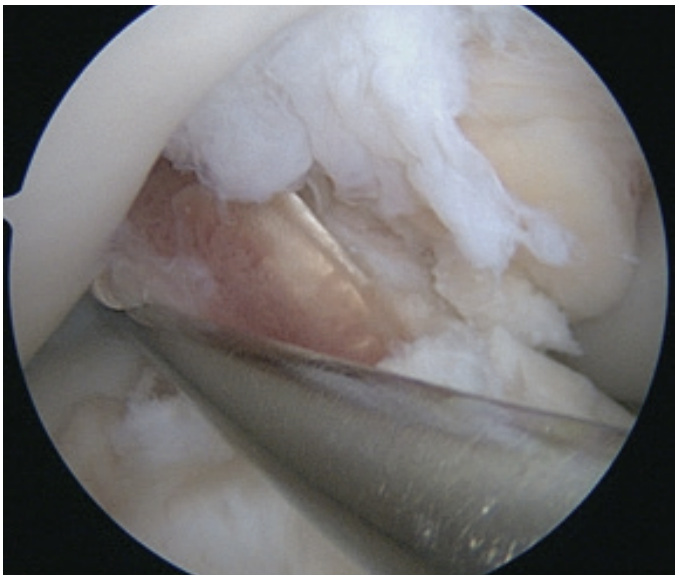

Figure 15. The uptight anterior cruciate ligament graft.

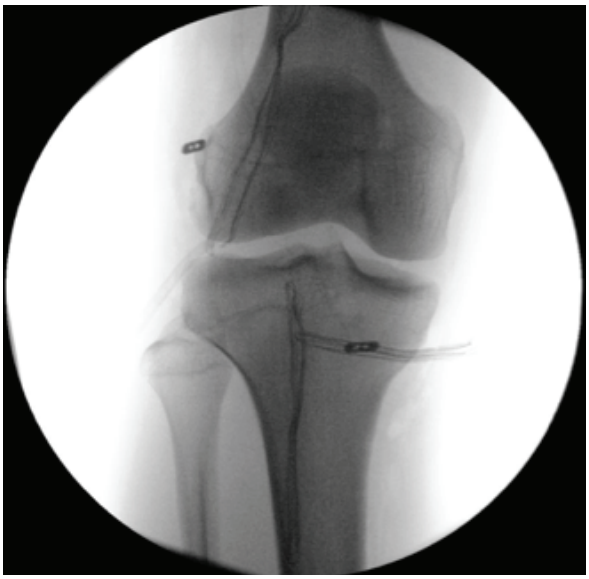

Figure 16. X-ray control after proximal and distal anterior cruciate ligament graft fixation.

Figure 17. Sutured iliotibial band after anterolateral stabilization with the modified Lemaire technique.

Figure 18. Patient's knee after the closure of the wounds.

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ONE-STAGE BILATERAL TOTAL HIP REPLACEMENT USING DIRECT ANTERIOR APPROACH VIA „BIKINI“ INCISION: A CASE REPORT

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ABSTRACT

Background: Osteoarthritis (OA) is a musculoskeletal condition that is affecting an increasing number of individuals due to an aging population. The aim of our case report was to present one-stage bilateral efficient direct anterior total hip replacement via „bikini" incision, to describe the course of the operation, as well as the advantages and the disadvantages of this procedure.

Case study: A 38-year old patient, without any comorbidities, presented with severe OA of both hips. Due to co-existing OA on both joints and the patient's motivation and desire for faster recovery, he underwent a one-stage bilateral hip replacement using a direct anterior approach via a „bikini" incision. Physical therapy began immediately after the surgery and the patient was verticalized on the first postoperative day. Eight days after the procedure, the patient was discharged from the hospital.

Conclusion: One-stage total hip replacement should be considered for patients with OA of both hips to reduce the postoperative hospital stay and the need for long-term rehabilitation.

KEYWORDS: Total hip replacement, osteoarthritis, direct anterior approach, bikini incision

INTRODUCTION

Osteoarthritis (OA) is a highly prevalent disease, affecting 303 million people worldwide, making it the most common progressive musculoskeletal condition that affects joints [1].

Even though OA can affect any joint, it mainly affects the hips and knees as the predominant weight-bearing joints [2,3]. Although novel treatments are emerging daily, modern medicine still hasn't found a treatment that would stop the progression of OA. Therefore, joint replacement surgery is the gold standard in OA treatment. Surgical techniques, as well as surgical implants, have constantly been improving.

The direct anterior approach (DAA) is a muscle-sparing technique associated with fewer surgical complications, shorter duration of postoperative rehabilitation and reduced chance of hip joint dislocation [4,5]. Efficient direct anterior (EDA) hip replacement represents a concept of the DAA approach to the hip with the use of specific instruments which enable shorter operating time and limited muscle damage. One-staged bilateral hip arthroplasty is a surgical procedure in which both hips are treated. It can be considered in patients suffering from bilateral severe hip OA, who are motivated and require combined surgery [6].

Here we describe a case of a patient with severe bilateral hip OA that underwent a one-staged bilateral total hip replacement using a DAA via „bikini" incision.

CASE STUDY

A 38-year-old patient, who has been a professional handball player for 15 years, presented to an orthopaedic outpatient clinic with long-term pain in both hips that lasted for 11 years. The patient reported experiencing joint pain on a daily basis, which was more intense with exercise. Previous treatment included intra-articular applications of hyaluronic acid, platelet-rich plasma and mesenchymal stem cells, all of which were ineffective in long-term pain relief. Clinical examination marked a limitation of motion in both

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joints. The flexion in the right hip was 80 degrees and in the left 100 degrees. Internal rotation was disabled on both sides, i.e., 0 degrees, while external rotation in the right hip was 20 degrees, and in the left 30 degrees. All the activities involving the hip joints were extremely painful. The radiographic assessment confirmed the diagnosis of severe OA of both hips (Figure 1). Due to severe osteoarthritic changes that complicated the patient's daily life and functions, the patient's good general health and his motivation to solve the problem with both hips in a single act surgery, it was decided to perform a one-staged bilateral total hip replacement.

After preoperative patient assessment and procedure planning, the patient was directed to the operating theatre. The operation was performed under general anesthesia with the patient positioned in the supine position. The right hip was approached first. After sterile operative field preparation and surgical draping, a „bikini" incision, parallel to the inguinal skin crease, was made for the DAA to the hip. After retracting the skin both superiorly and inferiorly, a longitudinal dissection of the fascial layer of the tensor fascia latae (TFL) was made on the lateral side of the incision. By blunt dissection, an interval between the sartorius muscle and TFL was exposed. Followed by further retraction of rectus femoris muscle and TFL, the hip joint capsule was exposed and capsulotomy was performed. The femoral head was removed, and the acetabulum was processed according to preoperative planning. A cementless acetabular shell was implanted (Trilogy® Acetabular System, size 62 mm, Zimmer) together with an acetabular insert (Longevity® Highly Crosslinked Polyethylene, Elevated Rim Liner, Zimmer). Further preparation was made for the femoral component implantation by placing the leg, below the other leg, in adduction, extension and external rotation in the hip. After femoral processing, trial reposition, and stability assessment, an original femoral stem was implanted (Corail® Hip System, Cementless Femoral Stem, size 11, DePuy). The femoral head (Biolox® Delta Ceramic Femoral Head, size 32 mm + 5.0, DePuy) was placed and the reduction of the hip joint was performed. Drainage was placed before wound closure, which was performed using running sutures for TFL fascia, interrupted sutures for the subcutaneous tissue and intracutaneous suture for the skin. Successively, the same procedure was performed for the left hip. Following components were implanted: acetabular shell (Trilogy® Acetabular System, size 62 mm, Zimmer), acetabular insert (Longevity® Highly Crosslinked Polyethylene, Elevated Rim Liner, Zimmer), femoral stem (Corail® Hip System, Cementless Femoral Stem, size 12, DePuy) and the femoral head (Biolox® Delta Ceramic Femoral Head, size 32 mm + 5.0, DePuy). The sizes of the implanted components of both hips were equal to the preoperative planning. The leg lengths after the replacement of both hips were equal. The position of both hip prostheses is shown in Figure 2. It was decided not to change the patient's existing hip rotation center. In this way, multiple benefits were achieved: muscle tension remained unchanged, avoidance of acetabular medialization removed the possibility of ischiofemoral impingement in external rotation, and preserved bone thickness in the pelvis for future revision surgeries. Acetabular components were implanted following the existing bone block and pelvic shape. The higher inclination of the acetabulum on both sides was compensated by the use of an elevated polyethylene insert which preserved the stability of the prosthesis.

A total intraoperative blood loss, with the intravenous application of 2g of tranexamic acid, was 700 mL. On the first postoperative day, there were 560 ml of blood in the drainage system. The patient was mobilized using crutches and physical therapy began. The patient was receiving antibiotics and antithrombotic prophylaxis during his hospital stay. Postoperatively, the patient spent 8 days in the orthopedic department and was discharged home from the hospital. Two weeks after the surgery, the patient was walking without crutches and any pain. On the clinical examination, the flexion in both hips in the supine position was 120 degrees. The internal rotation in the right hip was 20 degrees and in the left 30 degrees, while the external rotation in both hips was 50 degrees.

DISCUSSION

In recent years, many studies were conducted to determine the potential superiority of the anterior approach over the posterior and lateral approaches to the hip. According to some researchers, EDA hip replacement provides better outcomes for the patient in terms of duration of postoperative rehabilitation, shorter average hospital length of stay, more rapid recovery with less pain and less use of narcotic pain medications [7–9]. The DAA minimizes damage to the surrounding soft tissues, resulting in lower inflammatory serum markers. Arguments raised against its use include lateral femoral cutaneous nerve (LFCN) neurapraxia and iatrogenic trochanteric fractures [7]. Also, due to the long learning curve, it takes a long time to educate surgeons and completely switch from a posterior and lateral approach to a DAA [5,10]. One-staged bilateral total hip arthroplasty was initially designed with the idea of reducing the postoperative number of days in the hospital and the need for long-term rehabilitation. A systematic review by Muskus and colleagues showed that there is no difference in mortality and incidence of systemic complications between separate and simultaneous surgeries when the surgery is performed in younger and healthy patients without cardiovascular comorbidities [6]. A 7-year data review by Johnston et al. proved that treatment costs are higher with staged surgery than with simultaneous bilateral hip replacement. Furthermore, there was no

difference in patient satisfaction rates and Harris Hip Scores improvements in pain and function between the groups [11]. What facilitates the performance of simultaneous bilateral total hip arthroplasty is the supine position of the patient for the direct anterior hip approach. Therefore, there is no need to turn the patient during surgery or to have a double sterile operative field preparation and surgical draping, as there would be for the lateral decubitus patient position for the lateral or posterior hip approach. Furthermore, in the supine position for DAA, it is much easier to compare the length of the patient's legs.

After bilateral hip joint replacement, it is impossible to walk with a partial load because there is no unoperated leg that can serve as a support. However, a meta-analysis by Tian et al. concluded that early full weight-bearing after cementless total hip arthroplasty is safe and without increased risks of postoperative complications compared to partial weight-bearing [12]. Therefore, we allowed our patient to walk at full load and to discard crutches at his own discretion. Even though, in this case report we did not follow the patient for a longer period, the patient's condition 2 weeks after the surgery, range of motion and ability to walk without crutches gave us the confidence in showing the operative technique and short term follow-up of this patient.

After the development of the DAA, there was a demand for a type of incision that would leave a minor cosmetic defect compared to the longitudinal incision. Also, one of the potential concerns about the DAA performed via longitudinal incision was inferior wound healing [13,14]. „Bikini" incision provides greater patient satisfaction due to cosmetic reasons (Figure 3). The main issue with the longitudinal incision is presented in not following the anatomic cleavage lines and its perpendicularity to the relaxed skin tension lines, which can result in scar widening [13]. Uncomfortable symptoms related to both longitudinal and bikini stitching include pruritus, pain and paresthesia [13]. Potential complications after a „bikini" incision include an increased possibility of infection and an increased risk of LFCN injury. Also, one of the concerns associated with „bikini" incision is in reduced intraoperative visibility of components, which can disrupt orientation and make component management difficult [13].

CONCLUSION

OA is the most common chronic joint condition that correlates with age. The outcome of surgical treatment is greatly influenced by the patient's comorbidities. With a multimodal approach, based on further advances in surgical technique and careful patient selection, pain control management, reduced blood loss and even more effective thromboprophylaxis one-stage surgery for bilateral total hip replacement will potentially become the future of orthopedic treatment. Furthermore, every patient with multiple joint OA should be accessed based on an individual approach. One-stage bilateral hip replacement surgeries require shorter, but more intensive rehabilitation. Therefore, it is important to recognize a determined and motivated patient whose attitude will improve the success of the operation.

CONFLICT OF INTEREST:

The authors declare that there is no conflict of interest.

The patient gave his informed consent prior to his inclusion in case report.

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FIGURES

Figure1. Anteroposterior X-ray image of the patient's hips showing severe bilateral coxarthrosis.

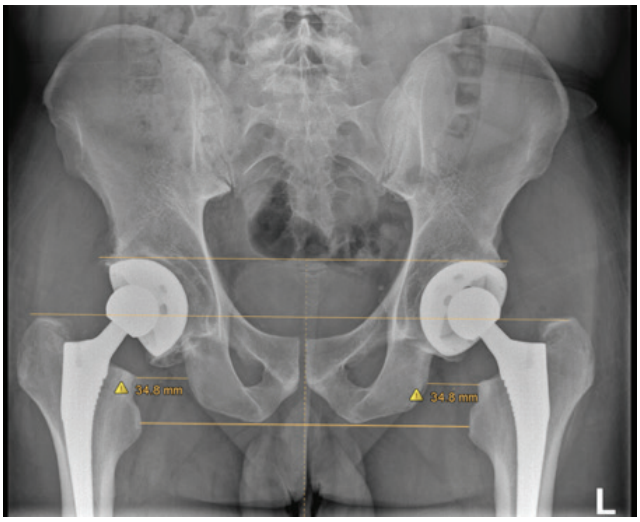

Figure2. Anteroposterior X-ray image after bilateral hip replacement surgery. The line that connects the tops of two acetabular components and the line that connects two tops of greater trochanters (through the center of implanted femoral heads) are parallel to the bottom pelvic line that connects two lesser trochanters. The higher inclination of the acetabulum was compensated by the use of an elevated polyethylene insert not to damage the stability of the prosthesis.

Figure3. Skin scars eight days after one-stage bilateral total hip replacement using direct anterior approach via "bikini" incision.

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CT ARTHROGRAPHY PRIOR TO CT GUIDED BONE LESION BIOPSY, A CASE REPORT

Maja Prutki[1], Elvira Krešić[1], Ana Marija Alduk[1], Mario Josipović[2], Ivan Karlak[3], Mislav Čavka[1]

ABSTRACT

Background: Suspicious bone lesions are very common and often need a pathohistological verification. Surgical (open) and percutaneous image guided biopsies can be used to get a sample for pathology analysis. As the barriers of lesion compartment shouldn't be crossed due to risk of dissemination, transarticular approach is not advised.

Case study: We present a case of 57-year-old female patient with lung cancer history and left knee pain. Lytic lesion in lateral femoral epycondile with fluorodeoxyglucose (FDG) uptake was confirmed by positron emission tomography with computed tomography (PET/CT). Surgical biopsy was performed and pathohistological analysis showed no tumor cells. A month later a computed tomography (CT)-guided percutaneous bone biopsy with CT arthrography was performed and pathohistological analysis confirmed metastatic lesion.

Conclusion: CT-guided percutaneous bone biopsy is a safe, effective and minimally invasive procedure. CT arthrography can add some additional information for anatomical positioning in order to avoid transarticular approach in reaching the targeted lesion.

KEYWORDS: Metastatis, Bone Neoplasms, Interventional Radiology, Image-Guided Biopsy, Orthopedics

INTRODUCTION

Suspicious primary bone tumors or bone metastasis constitute frequent indications for pathohistological analysis. Specimens for pathohistological analysis can be obtained by surgical (open) biopsy or core needle biopsy. In order to perform a safe bone biopsy anatomy knowledge is crucial. Biopsy route should avoid neural, vascular and visceral structures [1]. The presumptive decision to approach a lesion as metastasis of a known primary neoplasm without pathohistological confirmation may erroneously lead to inappropriate treatment of benign diseases or incorrect management of a second primary tumor. We report a case of a female patient with lung cancer history and femoral suspicious bone lesion. CT-guided bone biopsy with CT arthrography was indicated after unsuccessful open bone biopsy.

CASE STUDY

A 57-year-old female patient presented with left knee pain which was not related to trauma. Six months prior she underwent left superior lung lobe resection. She also underwent four cycles of chemotherapy. On the left knee x ray a lytic lesion in lateral femoral epycondile was noted. The lesion showed FDG uptake on PET/CT (Figure 1).

She was referred to orthopedic department and decision to make surgical biopsy was made. Pathohistological analysis of surgically obtained specimens showed no tumor cells. A month later, multidisciplinary team decided to refer the patient to radiology department for the CT-guided bone biopsy under local anesthesia. For the purpose of planning biopsy, 15 ml of iodinated contrast and 15mL of saline solution was injected into the knee joint under ultrasound-guidance. CT arthrography performed immediately after the contrast application, showed lytic lesion in femoral lateral epicondyle and bone defect after surgical biopsy above the lesion (Figure 2a). CT arthrography depicted the joint space and helped to plan a safe approach to the lesion., without passing through joint space (Figure 2b). After the biopsy needle tip was adjacent to the lesion, which was confirmed by a CT scan (Figure 2c), biopsy was performed (Figure 2d) After one-hour of observation the patient was discharged home.

Pathohistological analysis confirmed metastatic lesion from lung origin (adenocarcinoma) and the second line of chemotherapy was started. Follow up PET/CT showed no metabolic activity in the biopsy tract, which excluded seeding with tumor cells.

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DISCUSSION

CT-guided bone biopsy is a safe, accurate and minimally invasive method to define the diagnosis [2-6]. CT arthrography is a complementary method by which a safe biopsy approach can be planned without passing through the joint space. Core needle biopsy yields diagnostic results comparable to open biopsy [7]. The rate of complications in CT-guided biopsies is very low (1.1%), while in open biopsies it may be up to 16% [8]. The diagnostic accuracy is variable according to the location of the lesion, where accuracy is higher for lesions located in the extremities and pelvic bone than the lesions located in the vertebral column [9]. In the literature, the rate of diagnostic definition of percutaneous biopsies of musculoskeletal lesions is 69-93% [10-15].

Although the lesion is approached through coaxial needle, transarticular approach is not recommended [16] due to risk of dissemination and even potentially infection [17]. Consequentially CT arthrography was performed to plan a safe approach to the lesion, without crossing joint space with the biopsy needle. Iodine contrast was injected under ultrasound guidance to reduce further radiation. As to our best knowledge this is the first case of periprocedural arthrography during the bone lesion biopsy.

CONCLUSION

CT-guided bone biopsy is safe and effective procedure that yield diagnostic accuracies up to 93%. It is minimally invasive procedure, that can be done outpatient under local anesthesia. Open biopsies should be performed only if CT-guided biopsies are not possible due to lesion localization. Although CT guided biopsy remains a golden standard, CT arthrography can be used as an additional tool in case of periarticular bone lesions to define anatomical structure more clearly.

CONFLICT OF INTEREST:

The authors declare that there is no conflict of interest.

The patient gave her informed consent prior to her inclusion in case report.

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FIGURES

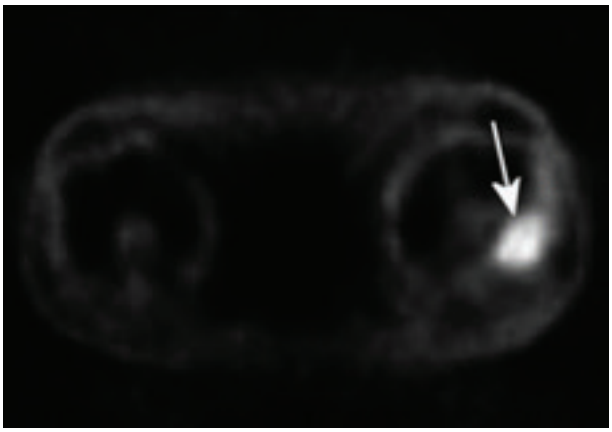

Figure 1. PET/CT identifies area of major metabolic activity in the left lateral femoral epicondyle.

Figure 2. Pre-biopsy CT (2a) – sagittal reconstruction shows lytic lesion in lateral femoral epicondyle (arrow), bone defect after open biopsy (arrowhead), intraarticular iodinated contrast agent (star). 3D Volume Rendering Technique (VRT) (2b) with demarcation of intraarticular space (arrows). CT during biopsy (2c) – biopsy needle tip on the edge of the lytic lesion. Postprocedural CT (2d) – small amount of air inside the lytic lesion in the field of biopsy which is a normal postprocedural finding (arrow).

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MEDIAN ARCUATE LIGAMENT SYNDROME WITH POST STENOTIC PANCREATICODUODENAL ANEURYSM: CASE REPORT

Jurica Žedelj[1], Vedrana Biošić[2], Hrvoje Silovski[1], Igor Petrović[1], Tomislav Meštrović[1], Dražen Perkov[3]

ABSTRACT

Background: Median arcuate ligament syndrome (celiac artery compression syndrome, Dunbar syndrome) is an infrequent form of chronic mesenterial ischemia. The culprit for a sub optimal celiac blood flow is a low-positioned median arcuate ligament which is an arch of fibrous tissue connecting the diaphragmatic crura. Symptomatic patients complain of postprandial pain situated in the epigastrium. Still, most of the individuals proven to have some form of celiac artery compressions report no complaints at all. The gold standard for diagnosis is a CT angiography and treatment is surgical. The median arcuate ligament is transacted with or without additional endovascular treatment.

Case study: We present the case of a 50-year-old male patient with a radiologically confirmed diagnosis of median arcuate ligament syndrome treated surgically at our institution. An open approach was used since the patient had a previous median laparotomy scar. Due to a post stenotic pancreaticoduodenal aneurysm coil embolization was additionally performed. On follow up the patient had no further complaints.

Conclusion: Patients with chronic postprandial pain require a systematic approach. In the differential diagnosis of abdominal angina, although uncommon, median arcuate ligament syndrome is to be remembered. The diagnosis is rather straightforward once clinical suspicion is established and treatment-wise minimally invasive surgery is performed whenever possible.

KEYWORDS: median arcuate ligament, chronic mesenterial ischemia, aneurysm, celiac artery compression syndrome

INTRODUCTION

Median arcuate ligament syndrome, also called celiac artery compression syndrome or Dunbar syndrome is a rare form of chronic mesenterial ischemia. The median arcuate ligament is an anatomic structure situated behind the esophageal diaphragmatic hiatus (separating the aortic and esophageal hiatus) and it is formed by the fibrous parts of the diaphragmatic crura [1–4]. When positioned low (10-24% of people) it can cause compression on the celiac artery resulting in impaired blood flow to the intestine in times of increased splanchnic demands, usually postprandially [5]. As a result, unintentional weight loss occurs. Younger women seem to be more susceptible to this pathology [2,5,6]. The diagnostic method of choice is computed tomographic (CT) angiography - this successfully shows a so called "hook" stenosis in the celiac artery with decreased flow of contrast material [4-5]. In some cases, a post-stenotic aneurysm occurs (due to high pressure - high velocity blood flow at the narrow and compressed part of the vessel) [7,8]. Treatment in symptomatic individuals is often surgical and consists of releasing the arcuate ligament by laparoscopy or open procedure, with or without celiac ganglion resection (thought to additionally relieve abdominal pain, although the latter is not overly supported by evidence) [7,9]. In long lasting disease histological changes in the vessel may occur and additional endoluminal stent placing may be necessary [9]. In the case of post-stenotic aneurysm, additional treatment by interventional radiology is also in order.

CASE STUDY

A 50-year-old male patient was admitted to our Surgical Department through emergency care due to abdominal pain with radiological evidence of pneumoperitoneum. CT showed thickening of the jejunal wall and adjacent mesentery with a small amount of free air - the radiological finding was described as a perforation tectum. The CT also revealed an ill-defined tubular structure with axial dimensions of 2x1,7mm ventral to the head of the pancreas which was thought to be a vascular anomaly or aneurysm. Explorative laparotomy confirmed the radiology report and a partial jejunal resection with a latero-lateral anastomosis was performed. The vascular anomaly was not visualized intraoperatively.

The patient was released having had an uneventful hospital stay. Since complaints of postprandial pain continued during follow-up, an MSCT angiography

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was ordered which showed significant celiac stenosis with a post-stenotic pancreaticoduodenal aneurysm (21x16x16 mm). Median arcuate ligament was identified as the compression culprit and an elective surgery was scheduled. The patient already had a laparotomy scar, so we opted for an open procedure. The left hepatic lobe was mobilized and the diaphragmatic crura transected to gain access to the subdiaphragmatic aorta. The median arcuate ligament was released.

The intra- and postoperative course were uneventful, and the patient was released on the 4th postoperative day.

One month after the operation selective radiologic catheterization of the celiac trunk was performed. The aneurysm was situated at the transitioning part of the upper to lower pancreaticoduodenal artery. Coil embolization was performed. Control angiographic series showed a small celiac stenosis remnant, but since the patient had no more complaints of postprandial pain no further surgical or endovascular steps were undertaken.

DISCUSSION

Chronic mesenterial ischemia is a diagnosis we are often prone to overlook for prolonged periods of time. Median arcuate ligament syndrome is a rare cause of celiac compression but fortunately confirming the diagnosis is rather straightforward and relatively easy to reach once clinical suspicion is established. CT angiography is readily available in most institutions and even a colour doppler ultrasound can facilitate the diagnostic course. Was suboptimal blood flow in the compressed celiac axis the cause for jejunal perforation in our patient? Studies show that patients with viable upper and lower mesenterial arteries (due to collateral blood flow) should not experience ischemic changes to the extent of bowel necrosis [10].

Bearing in mind that a large percentage of people (13-50%) may have an anatomically low-positioned arcuate ligament with angiographic signs of compression with absolutely no symptoms and complaints, the question is posed - where lies the importance of median arcuate ligament syndrome [5]? It is a diagnosis to think of in the patient with chronic abdominal torment where perhaps CT or endoscopy have showed no pathology and the subjective findings are disproportional to the physical ones.

CONCLUSION

Patients with chronic postprandial pain require a systematic approach. Median arcuate ligament syndrome is a rare cause of abdominal angina, but diagnosis and treatment are easily accessible and usually successfully performed in a minimally invasive style [4,11] The gold diagnostic standard is CT angiography and surgical treatment consists of median arcuate ligament release (laparoscopically where possible) - with or without additional endovascular procedures. Treatment is reserved for symptomatic patients.

CONFLICT OF INTEREST:

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Conflicts of interest: There are no conflicts of interest.

Ethics approval and informed consent: The patient agreed to publish the clinical case.

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FIGURES

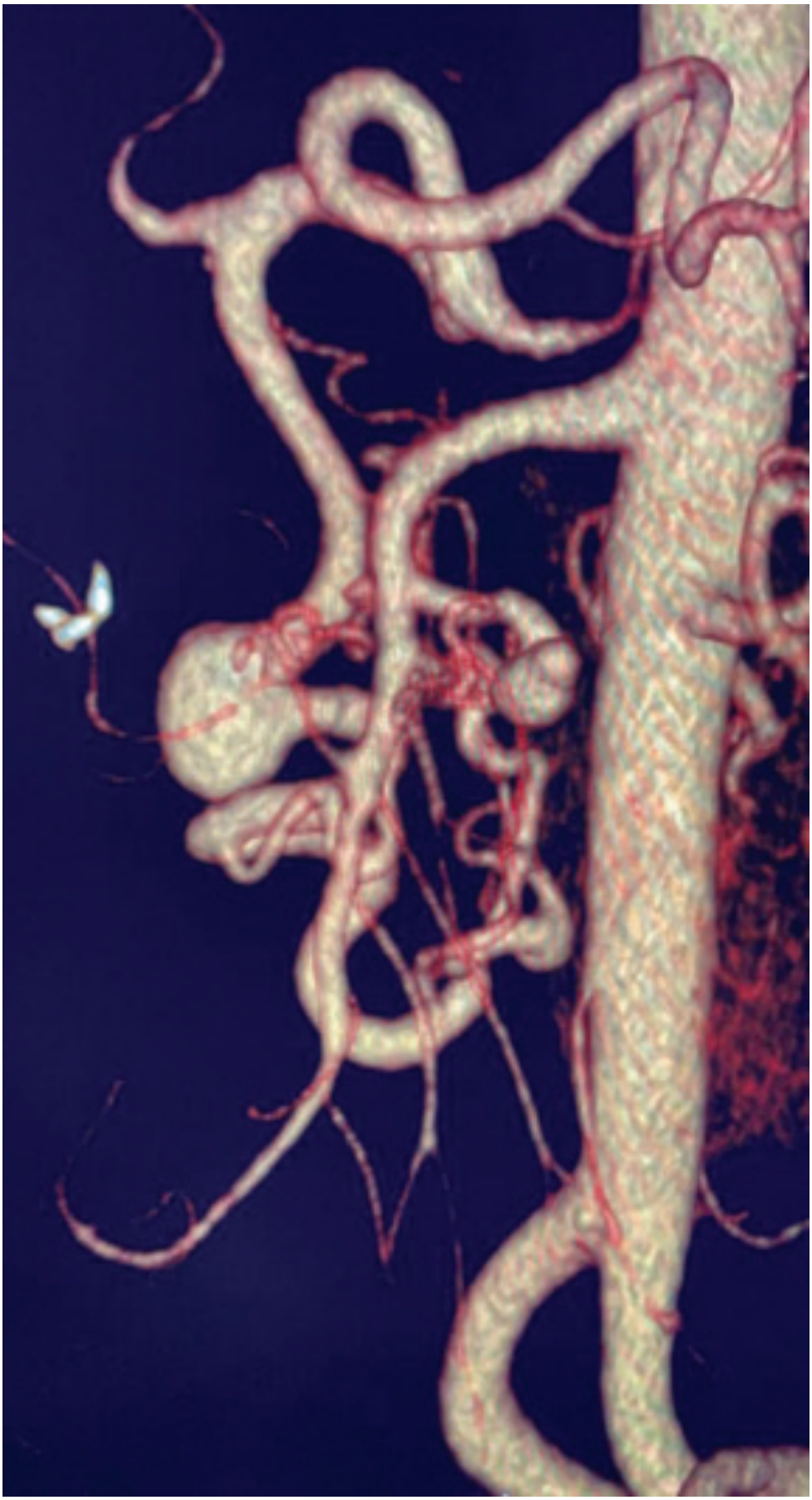

Figure 1. Celiac trunk stenosis with a post stenotic pancreaticoduodenal aneurysm.

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VENTRAL HERNIA REPAIR DUE TO LARGE DEFECT OF ABDOMINAL WALL CAUSED BY RIGHT ILIAC CREST FLAP AND MYOCUTANEOUS FLAP HARVESTING

Mario Rašić[1], Kristijan Ćupurdija[1], Dario Kožul[2], Valentino Lisek[2], Jakov Mamić[2], Domagoj Vergles[1]

ABSTRACT

Background: postoperative ventral hernia is one of the most common complications of surgery pertaining to the abdominal wall. Whether a hernia will occur depends on the size and location of the incision of the abdominal wall.

Case study: We report a case of a 65 years old male patient who developed a large ventral hernia after right iliac bone and myocutaneous flap harvesting for reconstruction purposes after maxillectomy. The intraoperative find was a 40 cm wide hernia sack with a hernia neck 15 cm in diameter. The right iliac wing was the inferior border of the hernia neck. The patient underwent anterior ventral hernia repair with implantation of polypropylene mesh into the preperitoneal space.

Conclusion: Placement of preperotoneal mesh in case of postoperative hernia reduces possibility of recurrence or infection.

Keywords: ventral hernia, anterior hernia repair, preperitoneal mesh, bone flap

INTRODUCTION

Ventral hernia is a protrusion of the tissue or an organ through an opening in the abdominal cavity. If it appears as a result of a muscle weakness caused by a previous abdominal surgery, it is called incisional hernia. Ventral hernia can slowly develop during a longer period of time, whether it is a result of a congenital defect or it develops as a result of gradual developing muscle weakness. There is no certain way in which we can predict which patients are the most likely to develop ventral hernia as a post procedure condition, but it will most likely happen in those who are smokers and have a preexisting case of diabetes mellitus, obesity or those who have been subjected to an emergency operation [1,2].

Approximately 50% of all incisional hernia develop during the first 2 years after the procedure and the percentage becomes even higher, increasing to 74% in a 3-year period and it can develop after any kind of procedure that is being done in the abdominal cavity [3-5].

The incidence also depends on the location and the size of the incision made during the procedure [6,7]. The highest rate has been documented in the case of medial laparotomy with the incidence being between 3 and 20% [4].

Depending on the size of the hernia, there are different approaches in the possible ways of treatment, in some cases, only simple suturing is enough, while in other situations there is a need for reconstruction of the muscle wall by forming a flap or by using a synthetic material, such as mesh. The operation approach can be laparoscopic or a classic open type surgery can be performed [8].

There are different indications in which the surgery is necessary, and it can go from a simple subjective sensation of an excruciating pain, and it can be performed in some more serious cases, because of incarceration and even strangulation of the hernia.

Ventral hernia is one of the most common conditions that surgeons come to contact with, whether it is congenital of formed postoperatively, with an incidence between 2 and 13% [9,10].

CASE REPORT

A 65-year-old patient who has been diagnosed with a case of ventral hernia. One of the important information from his previous history is a stroke from 2004. that has left the patient with a right-side hemiparesis and also a maxillary sinus carcinoma that was diagnosed in 2013. He underwent the procedure of maxillectomy with a jaw reconstruction using a miocutaneous flap and Iliac crest flap.

During a routine checkup in 2014. he was diagnosed with weakness and atrophy of his abdominal muscles that was a result of his hemiparesis. The doctors have also found a hernia in the cranial part of his postoperative scar with a diameter of approximately 6 cm for which

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he underwent the proper surgical treatment. When he came for a checkup in 2016., the doctors noticed a 30 cm long postoperative scar which stretched from his right lumbar and inguinal region with a prolapse of abdominal content inside the massive hernia. (Figure 1). No hernia has been found in the cranial part of the newly formed hernia that has been operated 2 years ago. It has been decided to perform the surgery while the patient was under general endotracheal anesthesia. During the procedure, the operators have found a 40 cm long ventral hernia that stretched in the direction of the right upper leg. The ventral hernia was about 15cm in diameter. Medially and cranially it went underneath the musculus obliquus abdominis, and laterally all the way to musculus quadratus lumborum.

Abdominal wall repair with an implementation of mesh was performed in the preperitoneal area, while in the caudal part, the mesh was fixed on the wing of the iliac bone by the use of steel screws. Postoperative recovery has gone according to plan so the patient was released from the hospital while being in good general health and he was given a recommendation of wearing hernia vest. He came for his scheduled appointment a month after the surgery with a seroma in the area of the postoperative scar and it has subsided during a 2 months' period and was eventually punctuated. (Figure 2.)

DISCUSSION

The wing of the iliac bone is a common place from which an autologous bone implant is harvested [11]. In this case report, the ventral hernia has occurred three years post-surgery, however, it can be developed in just days after the surgery. It is presented as a swelling of the stomach, reported pain and it is also possible to see a case of incarceration of the hernia. Operative possibilities are to perform an open surgery or to do the laparoscopic surgery of the abdominal wall. That includes the suturing of the soft tissue, strengthening the soft tissue by using the fascia or by implementing the synthetic mesh. Some of the most common postoperative complications are thromboembolism, another case of hernia, wound infection and even difficulty in breathing because of the heightened diaphragm.

Because of all of this, and also considering the price of using the synthetic mesh, a valid question is should the mesh be used as a prophylactic measure in those procedures that might result in the abdominal wall defect.

A randomized controlled study suggests that in a 2 year period, 28% of those patients who have been subjected medial laparotomy have also developed a ventral hernia as opposed to 0% of those in which mesh was used as a prophylactic measure. There have also not been any other complications reported in those patient with mesh, only a 16 minute longer period needed to close the abdominal wall [12].

It is also important to determine what is crucial in deciding what mesh to use, and that is the type of mesh and its location. The most important characteristic are the type of filament, tension and porosity. Some of the research claim that mesh which have less tension are more superior because of their flexibility and less reported patient discomfort. The mesh with bigger pores are considered to be the first choice because of the lowest chance of a later infection [13].

There are multiple locations in which a mesh can be placed, and each has some benefits and some drawbacks. To put it on the anterior fascia is the surgically easiest method, however there is a chance of infection because a skin flap is necessary. Laparoscopic surgery has made the intraperitoneal placement popular, but it is technically more difficult to perform and it requires dense suturing in order to prevent the movement of the intraabdominal organs between the mesh that has to have anti adhesive properties, and the abdominal wall. In this case, the mesh was placed preperitoneal, and that approach protected the mesh from the intraabominal content and the possible surface complications. According to the meta analysis that was made in the period from 1990. to 2015., this kind of placement is shown to have a lesser rate of recurrence and infection. [14].

CONCLUSION

Postoperative ventral hernia is one of the most common complications that surgeons come to contact with and it is necessary to consider the placement of the mesh as a prophylactic measure. Studies have also shown that the best approach in placing the mesh is preperitoneal because there is a lesser chance of a possible recurrence or infection.

CONFLICT OF INTEREST:

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Conflicts of interest: There are no conflicts of interest.

Ethics approval and informed consent: The patient agreed to publish the clinical case.

Authors' contributions: All authors that made substantial contributions to conception and design, and/or acquisition of data, and/or analysis and interpretation of data. All authors that participated in drafting the article or revising it critically for important intellectual content. All authors gave final approval of the version to be submitted and any revised version.

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FIGURES

Figure 1. Preoperative findings of 30 cm long scar and ventral hernia.

Figure 2. Postoperative clinical findings have shown no sign of hernia.

AUTHOR'S INDEX