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RECONSTRUCTION OF THE ABDOMINAL WALL IN ANATOMICAL PLANS. PRE- AND POSTOPERATIVE KEYS IN REPAIRING "COLD" INCISIONAL HERNIAS

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Abstract

Background and aims. *The clinical results of the vertical "vest-over-pants" Mayo repair were evaluated, and the risk factors for incisional hernia recurrence were studied. The purpose of this study is to point out the importance of reducing pre and post operative risk factors in the incisional hernia repair process in order to achieve a physiologically normal abdominal wall.*

Methods. *Twenty patients diagnosed with incisional hernia underwent an abdominal reconstruction procedure using the Mayo (Paletot) technique at Bichat Claude Bernard Hospital between 2005 and 2015. All procedures were performed by a single surgeon and all patients were pre-operatively prepared, identifying all coexisting conditions and treating them accordingly before undergoing surgery.*

Results. *All patients underwent at least one surgical operation before the hernia repair procedure and a quarter had experienced at least three, prior to this one. Nine patients had a body mass index of >30 kg/m2. Additional risk factors and comorbidities included obesity in 45%, diabetes mellitus in 10%, smoking in 55%, and high blood pressure in 40%.Hernia defect width was from 3 cm (25% F) to 15 cm (5% M) of which nine patients (45%) had a 10 cm defect. Most of the patients had an average hospitalization of 7 days. The patients were carefully monitored and were called on periodic consultations after 3, 6, and 12 months from the moment of the procedure. Patient feedback regarding hernia recurrence and complaints about the scar were noted. Physical examination is essential in determining the hernia recurrence therefore the scar was examined for any abnormalities that may have occurred, which was defined as any palpable or detected fascial defect located within seven centimeters of the hernia repair. Post-operative complications: seroma formation, wound hematoma, superficial and deep wound infection, recurrences and chronic pain were followed and no complications were registered during the follow-up period.*

Conclusions. *Reducing the risk factors to a minimum prior to surgery will increase the success of the incisional hernia repair and generate a positive impact on the patient's quality of life. The lofty goal of significant weight loss prior to elective hernia has shown to be the key factor in using the Mayo technique for incisional hernia repair. This study demonstrates that the Mayo repair technique is a suitable and trustworthy alternative for repairing incisional hernias with very good results. It's costs are minimal and it can be easily reproduced, even by less experienced surgeons.*

Keywords: incisional hernia, Mayo repair, risk factors

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Background and aims

The increasing number of available materials (synthetic, biologic or mixed) allows surgeons to choose between a wide variety depending on the indication, the site of implantation, the surgical approach and whether the operative field is contaminated or not. Synthetic mesh strengthens the abdominal wall, but the biological response to the material may cause complications [1-6]. The most commonly reported complications have been hernia recurrence, wound infection, wound dehiscence, mesh explanation, seroma, fistula formation and chronic pain. Rarely, incidence rates for complications such as hematoma/bleeding and death were reported. Post-operative timing complications have been rarely specified [7]. Comorbid conditions: surgical history, morbid obesity, pulmonary and cardiac disease, chronic constipation and urologic conditions need to be considered prior to undergoing surgical treatment in order to increase the success of the surgery and the positive impact on the patients' quality of life. Biologic mesh does play a valuable role in abdominal wall reconstruction but has similar recurrence rates as compared with published studies using prosthetic mesh [8]. Most prosthesis are expensive and cost is an important but often under-evaluated issue. Clear recommendations regarding ideal surgical techniques have not yet been established. In plastic surgery the use of surgical mesh is accepted only in abdominal walls with substance loss. The following reconstruction concept has been applied: if there is enough anatomical material the plastic repair should consist in the mobilization of anatomical structures. The Mayo method was elected for all non-emergency incisional hernia repairs, including those with large fascial defects (15 cm) in order to achieve a physiologically normal abdominal wall. The outcomes of this study are focused on the importance of reducing pre and post operative risk factors prior to surgery when using the Mayo repair technique.

Methods

The retrospective study included 20 patients diagnosed with incisional hernia operated on at Bichat Claude Bernard Hospital, Paris, between 2005-2015. We must mention that the small number of patients in this study is due to the fact that most procedures performed at Bichat Hospital are aesthetic operations so most of the patients chose the hospital due to the trust they had in their surgeon. For each patient, the following demographic, pre-operative, and post-operative data was collected: age, sex, body mass index (BMI), number of previous abdominal operations and hernia repairs, size of the facial defect, operating time, length of hospital stay, pre-operative and post-operative complications and hernia recurrences. Obesity was defined as a BMI of 30 or greater. All patients were pre-operatively prepared. In obese patients, pre-operative weight loss is essential to ensure the safety of anaesthesia, to reduce post-operative complications and reduce loss of domain. General anaesthesia with oro-tracheal intubation was used in all cases. Patients with cold incision hernias (non-emergency incisional hernia repairs) of the midline were selected for analysis, and the vertical "vest-over-pants" Mayo repair was evaluated (**Figure 1**). The traditional Mayo repair technique consists of a vertical overlap with adjacent aponeurotic structures. Additionally, an elliptical incision can be used for large hernias that require excision of excess skin. Using a fine-tipped instrument and electrocautery, abundant skin overlying the hernia is excised to clear fat from the hernia sac and to clear the abdominal wall circumferentially from the edges of the defect. The incision in the aponeurosis is extended longitudinally on either side of the hernia defect. Dissection of the hernia sac, reduction of the content and liberation of any adhesions. Excision of an edge of the hernia sac. Mattress sutures (0 Vicryl®, polyglactin910 or MERSILENE® Polyester Fiber Suture) are introduced approximately 2.5 cm from the edge of the aponeurosis on one side of the linea alba and 1 cm from the edge of the opposite side by U suture. When these sutures are tightened it draws one fascia beneath the other, creating a vertical fascial scar. The free edge of the overlapping flap is continuous suture with absorbable 2-0 Vicryl®, to the surface of the opposite aponeurosis, creating a second suture line [9,10-12]. These sutures hold the structures in apposition, and the intra-abdominal tension itself prevents displacement [12]. Drainage was used in all patients. The drains were removed when less than 15cc was collected. Elastic abdominal belt contention was used in all patients from third day post-surgery for a period of one month and a half.

Figure 1. "Vest-over-pants" Mayo repair.

Results

Twenty patients with incisional hernias underwent abdominal reconstruction using the Mayo/Paletot technique at Bichat Claude Bernard Hospital between 2005 and 2015. All patients were operated on by a single surgeon. There were 3 (15%) males and 17 (85%) females aged between 25 to 79 years old, with an average age of 52. All patients underwent at least one midline surgery before the hernia repair procedure and a quarter had experienced at least three, prior to this one. Nine patients had a body mass index of >30 kg/m^2. Additional risk factors and comorbidities included obesity in 45%, diabetes mellitus in 10%, smoking in 55%, and high blood pressure in 40%. Achieving the goals of repairing the defect, maintaining the abdominal domain, "Vest-over-pants" the Mayo repair was performed in all 20 patients. All hernias were midline. Hernia defect width was from 3 cm (25% F) to 15 cm (5% M) of which nine patients (45%) had a 10 cm defect. The average operating time was 2.5 hours. A closed suction drain was placed in position before closing the hernia repair site. Patients had two drains placed in position at the time of the hernia repair and these remained in place until drainage was less than 15 ml. Incisional hernia repair patients had an abdominal binder fitted for a period of one month and a half starting with third day post-operative. Most of the patients had an average hospitalization of 7 days. The patients were carefully monitored and were called on periodic consultations after 3, 6, and 12 months from the moment of the procedure. Patient feedback regarding hernia recurrence and complaints about the scar were noted. Physical examination is essential in determining the hernia recurrence therefore the scar was examined for any abnormalities that may have occurred, which was defined as any palpable or detected fascial defect located within seven centimeters of the hernia repair. Post-operative complications: seroma formation, wound hematoma, superficial and deep wound infection, recurrences were watched for and no complications were registered during the follow-up period. We explain this by the fact that reconstruction of the abdominal wall was done with its own material. No mesh or other adjuncts were used and no persisting inflammatory proliferative foreign body reaction occurred. Another fact is that healing process is much faster. Continuous negative suction to the operative site ensures the drainage of blood and plasma which facilitates healing explains the lack of seroma or hematoma. Infection is considered to be a major risk factor for incisional herniation, but because all the operations were scheduled in advance, the tissues were well vascularized, no intestinal wound was caused and no infection was recorded in this study. Also post-operative measures were applied to prevent the previously mentioned outcomes.

Chronic pain was evaluated using a phone questionnaire conducted in July 2015 for all patients who had incisional hernia repair, during this 10 year period, from 2005 to 2015, using the Mayo technique. Results showed that 10 patients complained of abdominal discomfort upon exerting effort. The pain was related to the larger size of the defect, which can been explained by the muscular changes. The lateral abdominal muscles retract, and become fatty and fibrous after their midline insertion to each other has been divided [13]. But chronic pain after ventral hernia repair is complex in nature and is more than likely multifactorial in etiology. Patient-focused outcomes are also important to consider after operations and should not be limited to simply measuring pain perception and the requirements for pain medication [14].

Discussion

Risk factors are divided into factors that cause an increased intraabdominal pressure and factors that impair wound healing, or both. Repair of recurrent incisional hernias in challenging patient populations, such as the morbidly obese, warrants special attention. These patients are more likely to develop primary incisional hernias, and the recurrence rates following incisional hernia repair in obese patients are higher than in lean patients [15,16]. Current expert opinion considers morbid obesity to be a potentially correctable risk factor for post-operative complications and hernia recurrence and efforts should be made for patients to lose weight prior to proceeding with an elective hernia repair, ideally to a BMI of less than 35 [17]. All patients included in the study underwent an initial surgical consultation with complete history and physical examination and for obese patients weight loss was mandatory in order to receive the proper hernia repair. Still nine patients had a body mass index >30 kg/m^2 after losing weight. Obesity increases intraabdominal pressure [15,18,19]. The lofty goal of significant weight loss prior to elective hernia repair seems to be the key to success in using the Mayo technique for incisional hernia repair. Also, the postoperative wound infection rate is higher in obese patients [20]. In clinical studies, smoking has been shown to significantly increase perioperative morbidity, particularly wound infection and hernia recurrence, after ventral and inguinal hernia repair [21,22]. It is also a risk factor for developing an incisional hernia after other operations [23]. It was noticed that although nine patients in our study were smokers no correlation was recorded about the influence of smoking and hernia repair success. Smoking is a corrigible risk factor and we advise that all efforts should be made to help a patient quit smoking prior to elective surgery. Hernia repair was conducted in our study on patients from 25 to 79 years old and no contraindication to elective hernia repair based on age alone was found. Four patients had diabetes and their blood glucose levels were checked and corrected before proceeding with an elective hernia repair. We know that diabetic patients have a longer wound healing time and this should also be taken into account from an anaesthesia point of view. Pulmonary diseases also cause an increase

in intraabdomillal pressure. Coughing further aggravates the situation [24,25,26,27]. Elective hernia repair should be carried out after cardiac and pulmonary disease have been previously investigated and treated keeping into account that these can increase in intraabdominal pressure and cause recurrence. Patients with chronic constipations should be treated prior to surgery. If a patient strains at stool repeatedly, intraabdominal pressure rises [24,25]. A quarter of the patients had experienced at least three operations prior to incisional hernia repair but no correlation was made between the multiple laparotomies and recurrence of incisional hernias. Complications need to be anticipated and plans devised in the event they may occur. In 2015, when the data was collected noseroma or hematoma was registered. Assumptions were made that seromas were transient and resolved spontaneously or closed suction were desirable. Drainage of the subcutaneous tissues through separate stab wounds may prevent hematoma or seroma formation. We would like to mention that electrocautery was used only to achieve hemostasis and most of the surgery was carried out using a traditional scalpel. A hypothesis was made: by using the scalpel no inflammation of the tissue was caused and no inflammation mediators were released. The use of electrocautery for flap dissection versus sharp dissection was not only associated with the decreased amount of operative blood loss and total drain volume, but also with increased seroma formation rate. Seroma was defined as any clinically apparent fluid collection under the skin flaps or in the axilla. Cellulitis, wound infection requiring drainage of pus, and full or partial thickness skin necrosis were all defined as wound related complications. Electrocautery dissection increases pro-inflammatory cytokine response in wound fluid, which may reflect an aggravated inflammation and increased potential for tissue damage [28].

The average operating time recorded in the study was 2.5 hours. This strengthens the hypothesis that longer operation times give rise to a higher postoperative wound infection rate [20]. Emergency operations have been identified as a risk factor for wound dehiscence [29,30]. It is important to keep in mind that this study included non-emergency incisional hernia repairs.

Postoperative awakening following general anesthesia, due to the presence of the endotracheal tube, must be done carefully in a timely manner so that the intraabdominal pressure will not cause any complications. Other conditions, like vomiting, hiccup, may generate an increase in the intraabdominal pressure, which may affect, any point of weakness in the abdominal wall, causing hernia to develop [31,32]. Heavy lifting must be avoided at all costs, however, some authors enable this restriction on their patients for only 6 months [33]. Documentation from other studies implies that abdominal binders diminish post-operative pain, seroma formation, psychological distress and post-operative discomfort [34-37]. We used the abdominal binders in order to maintain an anatomic position of the muscular plans and to ensure optimal healing. Abdominal binders have also been indicated to enhance mobilization, protect the patient's wound and thereby aid in coughing and promoting deep breathing [38]. Outcomes from our study showed that the use of abdominal binders prevents eviscerations and the recurrence of hernias. More studies are needed before being able to support the prophylactic use of abdominal binders.

Conclusions

The clinical results of the vertical "vest-over-pants" Mayo repair technique were evaluated, and the risk factors for incisional hernia recurrence were studied. Despite many controversies in literature regarding various operative approaches, mesh choices and repair techniques, particular patient characteristics such as BMI, diabetes, tobacco use, second surgeries and previous hernias need to be taken into account in an attempt to reduce the risk complications. Patient education is paramount and is centered around dietary modification and avoidance of increased intra-abdominal pressures, avoidance of constipation, smoking cessation, and weight loss. Patients are also taught to recognize the signs and symptoms of wound infection in order to avoid further complications involving recurrence of hernia and other occurrences that may compromise their health. This study is weak evidence for encouraging the use of Mayo repair for defects greater than 10 cm, because of the small number of patients and short term follow-up. It is important to point out that reducing pre-operative and post-operative risk factors in incisional hernia repair is a mandatory achievement in order to have good results. We remain optimistic that these outcomes will help recognize the presence of potentially risk factors and optimizing them prior to surgery will reduce both the morbidity and the rate of recurrence. Careful focus on the factors that lead to these recurrences may help in the planning of future operations.

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