

Mesh-Related Complication Rates of Two Different Mesh Types on Umbilical/Ventral Hernia Repair

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Abstract: Umbilical/Epigastric hernia is a rather common surgical problem. Approximately 10% of all primary hernias comprise umbilical and epigastric hernias. In this study the complication rates of different mesh types which were used to repair umbilical/epigastric hernias were investigated. A retrospective chart review was performed of 86 patients who underwent ventral herniorrhaphy with either Composite Mesh (CM, Group-1) or Dual Sided Mesh (DM, Group-1), were included in the study. Mean duration of follow-up was 22 months and no significant difference was demonstrated between groups in respects of hernia recurrence, wound complications, mesh infection, infection requiring removal, development of bowel obstruction, or persistent pain or discomfort. On subgroup analysis there was no significant difference between complication and recurrence rates in respect of meshes of different trademarks. This study showed no significant difference between dual sided and composite meshes in respect of mesh-related complications.

Keywords: Umbilical hernia, ventral hernia, hernia repair, dual-sided mesh, composite mesh.

INTRODUCTION

Umbilical/Epigastric hernia is a rather common surgical problem. Approximately 10% of all primary hernias comprise umbilical and epigastric hernias [1]. Approximately 175,000 umbilical hernia repairs are annually performed in the US [2]. It has been reported that the share of umbilical and paraumbilical hernia repairs among all repairs for abdominal wall hernias increased from 5% to 14% in UK in the last 25 years [3].

In general, umbilical hernias are more common in women than men[4]. Typically, a lump is observed around the umbilicus. Pain is the most common indication to visit a physician and undergo a repair [5]. Recurrence may develop even in cases where a prosthetic mesh is used. Recurrent umbilical hernias often tend to enlarge faster than primary ones and may behave as incisional hernias. In this study the complication rates of different mesh types which were used to repair umbilical/epigastric hernias were investigated.

PATIENTS AND METHODS

A retrospective chart review was performed of 86 patients with umbilical/epigastric hernias who underwent hernia repair. Ventral hernias were diagnosed by clinical examination or by radiographic findings. All patients over the age of 18 with/without a prior history of abdominal surgery, who underwent ventral herniorrhaphy with either Composite Mesh (CM, Group-1) or Dual Sided Mesh (DM, Group-1), were included in the study. Minors, patients who underwent herniorrhaphy previously, who had serious systemic diseases which may influence wound healing/recurrence or complication rates, who are

unable to fulfill postoperative recommendations and whose defect larger than 8 cm were excluded from the study. Incisional hernias were defined as a defect in the abdominal wall arising in a previous incision site.

Study Groups/Patients

Group 1: Composite Mesh (Polymesh inova (Polypropylene+PGA-PCL), Betatech Medical®, Istanbul, Turkey / Symbotex Composite Mesh™, Medtronic®, Minneapolis, USA / Composix™ BARD®, USA) (38 patients)

Group 2: Dual-sided Mesh (Polymesh Dual (Polypropylene+Silicon), Betatech Medical® Istanbul, Turkey / Dulex Dual Mesh, (Dual-sided ePTFE), BARD®, USA) (48 patients)

DATA COLLECTION

A total of 86 cases underwent the same surgical procedure performed by 1 particular surgeon were reviewed. Medical records were reviewed for patient demographics, medical and social history, clinical presentation, and radiologic examinations. Operative and anesthesia records were also reviewed for operative time, estimated blood loss, intraoperative fluid status. Length of stay, Persistent pain, Seroma,

Wound Infection, Mesh Infection Requiring Removal, Recurrence, Bowel Obstruction due to adhesions and reoperation rates were studied between groups. Patient follow-up was achieved by office records and phone interview to determine hernia recurrence or other operative complications including wound complications, bowel obstruction, or fistula development.

STATISTICAL ANALYSIS

Statistical analysis was performed using the Student unpaired t test with 2-tailed distribution for quantitative variables and chi-square test for categorical variables. P-values <0.05 were considered to confer significance. SPSS 17 was used to evaluate study data.

RESULTS

Of the 86 patients, 64 were female and 22 were male. The mean age was 49.5 years. Comparison of preoperative patient demographics demonstrated no difference respectively between groups. No further difference was demonstrated by patient demographics, comorbidity, presentation, social or operative history.

Three cases of wound infection occurred in Group-1, 2 cases in Group-2 ($p>0,05$). Seroma developed 1 patient in Group-1, 1 patient in Group-2 ($p>0,05$). One infection required reoperation and mesh removal with a subsequent development of hernia in Group-1. The other patients were treated with enteral antibiotics, and no further intervention was necessary. No other major complications occurred in the immediate postoperative period. Mean duration of follow-up was 22 months and no significant difference ($p>0,05$) was demonstrated between groups in respects of hernia recurrence (3.1%, 2.2%), wound complications (1%, 1%), mesh infection (1.1% 0%), infection requiring removal (0.8%, 0%), development of bowel obstruction (0% , 0%), or persistent pain or discomfort (8%, 12%). On subgroup analysis there was no significant difference between complication and recurrence rates in respect of meshes of different trademarks.

DISCUSSION

Hernia is an ancient word of Greek origin "Hernios", meaning bud or sprout, reflecting in part the pathophysiological mechanisms of the disease. Hernias are very common, with an estimated prevalence of about 5% in the general population (about 8% in males and 2% in females). Going back to the distant past, Greek and Egyptian surgeons, as reported in the Ebers papyrus (1550 BC) proposed bending as a treatment for hernias [6]. Hippocrates (5th century BC) made the first complete description of the disorder. Jumping to the 6th century AD, the Italian Paolod'Eginain his work *De Medicina* describes his intervention for inguinal hernia; it will remain a classic until the end of the 18th century[7]. The main advances of this treatment proposal were: ligation and section of the sac with

removal of the testicle or alternatively "ferrum candens" with removal of the testicle.

At the end of the 19th century Witzel for the first time attempted inguinal hernia repair by using a silver mesh; other attempts using gold, silicon and other materials experienced a lot of complications and were quickly abandoned[8]. After the introduction of polypropylene by Nobel Prize winner Giulio Natta together with Karl Ziegler in 1954 [9] this material was adopted for inguinal hernia repair and rapidly gained, after the establishment of original methods such as Lichtensteins'[10] Trabucco's [11] and other repair techniques on other types of hernias.

Today as a result of medicotechnologic breakthrough we discuss which mesh on which hernia [12,13]. Since the invention of many new synthetic materials has allowed for different types of prosthetic grafts to be used in hernia repair. In the 1950s, polypropylene mesh was first developed by Dr. Francis Usher. Its use in hernia repair was found to be associated with low hernia recurrence rate. This design was modified into a knitted construct in the 1960s which has served as the basis for most prosthetic meshes in the twentieth century. Original polypropylene meshes consisting of dense "heavyweight" material were occasionally associated with significant inflammatory reactions eventually leading to mesh shrinkage and loss of abdominal wall compliance[14]. Newer generation "lightweight" polypropylene mesh caused decreased inflammatory reaction leading to improved abdominal wall compliance while still providing adequate tissue ingrowth [14]. Polypropylene mesh, however, may not represent the most ideal mesh for intraperitoneal placement. While short-term follow-up studies have demonstrated the safety of polypropylene mesh when adjacent to bowel, multiple studies and case reports have described concerning problems when polypropylene mesh is placed intraperitoneal or adjacent to bowel. Reported findings include intense intraabdominal adhesion formation, intestinal erosions, and enterocutaneous fistulas [14-19]. The response to associated problems seen with polypropylene mesh was the creation of a combination of materials designed to meet the varying challenges of intraabdominal placement against different surfaces, visceral, and parietal[14]. Although they also have many types of complications [20, 21], dual sided and composite meshes showed to be safer and more effective on ventral hernia repair. Reducing the density of polypropylene and creating a "light weight" mesh theoretically induces less foreign body response, results in improved abdominal wall compliance, causes less contraction or shrinkage of the mesh, and enables better tissue incorporation; however, their clinical advantages have not been clearly documented.

Newer bilayer prosthetic devices are designed for open intraperitoneal inlay placement. They have two

sides, one is polypropylene and the other side is a non-adherent material to face viscera. Two tails that are connected to the bilayer patch were sutured to fascial edges to avoid migration[22, 23]. This study showed no significant difference between dual sided and composite meshes in respect of mesh-related complications.

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