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ARAŞTIRMA / RESEARCH

Shall we use a mesh in every patient undergoing repair surgery for umbilical hernia? a prospective study

Umblikal herni onarımında her hastaya mesh koyalım mı? prospektif klinik çalışma

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Abstract

Purpose: The aim of this study is to compare the outcomes in patients with umbilical hernia who underwent suture-only repair (primary suture repair and Mayo's repair) to those with mesh (hernia repair with prolene or the Ventralex Hernia Patch (VHP) hernia repair).

Materials and Methods: ASA 1 and ASA 2 patients who had no medical condition requiring surgical intervention other than umbilical hernia were included in this study.. Small hernias were repaired by suturing only while mesh repair was used for medium size and large hernias. Among parameters to be assessed were presence of comorbidities, hernia repair techniques, postoperative complications, and postoperative recurrence rates by repair techniques. Follow-up assessments including physical examinations and/or ultrasound studies were performed to evaluate potential recurrences and other complications.

Results: A total of 153 patients were included in the study. The incidence of seroma formation was significantly higher in the prolene mesh group than others. Recurrences occurred in four out of 25 patients who underwent primary repair (16%) and three out of 69 patients who underwent Mayo's repair (4.3%). Recurrence rates were statistically significantly higher in the primary suture repair group than the other groups.

Conclusion: In this study, overall recurrence rate following umbilical hernia repair was found to be 4.57%. Recurrences were not observed in mesh group. Low complication and recurrence rates suggest that this technique may be an appropriate surgical modality to repair umbilical hernias 2 cm or less in size. Umbilical hernia repair with mesh appears to be superior over than tissue-suture repair without mesh.

Keywords: Umbilical hernia, primary repair, postoperative complications, recurrence.

Öz

Amaç: Çalışmamızda sütür (primer ve Mayo tekniği ile onarım) ve mesh ile (prolen ve ventralex hernia patch (VHP) ile herni onarımı) ameliyat edilen hastaların sonuçlarını karşılaştırmayı amaçladık.

Gereç ve Yöntem: Çalışmaya ASA 1 ve 2 kategorisinde ve umblikal herni yanında ek ameliyat girişimi yapılacak patolojisi olmayan hastalar alındı. Küçük herniler suture tekniği, orta ve büyük herniler mesh ile onarıldı. Hastalar cinsiyet, yaş, vücut kitle indeksi, ek hastalık varlığı, herni onarım teknikleri, postoperative komplikasyonlar, postoperative tekniğe göre nüks oranları açısından değerlendirildi. Hastalar ameliyat sonrası 1. Hafta ve 6. Ay nüks ve diğer komplikasyonlar açısından muayene ve/veya ultrasonografi ile kontrol edildi.

Bulgular: Çalışmaya toplam 153 hasta alındı. Primer onarım, Prolen mesh grubunda seroma oranı diğer üç gruptan belirgin yüksek bulundu. Primer onarım uygulanan 25 hastadan 4' ünde (16%), Mayo takviye yapılan 69 hastadan 3' ünde (4.3%) nüks görüldü. Primer onarım yapılan grupta nüks oranı diğer gruplardan istatistiksel olarak belirgin yüksek bulundu.

Sonuç: Çalışmamızda umbilical herni onarımı sonrası nüks oranı %4.57 olarak bulundu. Prolen ve VHP mesh ile umblikal herni onarımı sonrası çalışmamızda nüks saptamadık. Komplikasyon ve nüks oranı düşüklüğü bu tekniği 2 cm ve altındaki umbilical herni ameliyatları için iyi bir yöntem olarak düşündürmektedir. Umbilikal fıtık onarımlarında; mesh ile onarım, non-mesh/doku-dikiş onarımından daha üstün gözükmektedir.

Anahtar kelimeler: Umblikal herni, primer onarım, postoperatif komplikasyon, rekürrens.

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INTRODUCTION

Umbilical hernia, which is a relatively rare type of abdominal wall hernias, accounts for 4% of all hernias. The etiology of umbilical herniation is multifactorial. Weakened fascial tissue as well as chronically increased intra-abdominal pressure are major predisposing factors[1]. Umbilical hernias are often symptomatic and prone to incarceration because of the adherence of omentum to the hernia sack[1]. For this reason, most hernias require surgical repair. Various surgical techniques have been developed since an abdominal hernia repair procedure was first performed by Williams J. Mayo in 1901, however a gold standard of treatment has not been determined yet for umbilical hernia as with any other types of abdominal hernia[2,3]. About 175,000 umbilical hernia repair procedures are performed each year in the US[3].

When patients are presented for abdominal contouring surgery, assessing the umbilicus for abnormalities is a component of the physical examination. Patients may have a swelling resulted due to hernia, or bulge above, underneeth, or on the side of the umbilicus. Patients may have complained that they have an outer belly button visiblity, which is usually the result of the presence of a umblical hernia. Pre-operative imaging and general surgery consultation can be organized at the request of the surgeon. Treatment for symptomatic umbilical hernias is surgical. There are many different approaches and techniques described for abdominal hernia repairs[4].

Currently the rate of recurrences is relatively low owing to advanced technology materials, surgical techniques, anesthesia, the use of antibiotics and advanced postoperative care; but recurrences still remain an important problem following umbilical hernia repair. The recurrence rate after suture repair technique ranges from 10% to 30% compared with up to 10% in the mesh repair group[5].

In this study we aimed at comparing the outcomes in patients with umbilical hernia who underwent suture-only repair (primary suture repair and Mayo's repair) to those who underwent hernia repair with mesh (hernia repair with prolene or the VHP hernia repair) in terms of recurrences, hematoma, seroma, infections and revealing reasons possibly underlying recurrences.

MATERIALS AND METHODS

Patients and Methods

The present study was conducted according to the recommendations of the Declaration of Helsinki on Biomedical Research Involving Human Subjects. This prospective clinical study was performed at our hospital, Department of General Surgery after obtaining approval of the Local Ethics Committee(KAEK-50-1311). All of the patients gave written, informed consent before the operation. This study was designed in an adult population undergoing elective umbilical hernia repair between January 2010 and December 2015.

All patients underwent abdominal ultrasound before the surgery. The inclusion criteria were patient's consent to participate in the study, Absence of any concurrent pathological condition requiring surgical intervention, in addition to umbilical hernia ASA 1 or 2 Patients, Exclusion criteria were a recurrent or trocar site hernia; incarceration or strangulation of hernia; known ascites, connective tissue disease, kidney failure, and hypoalbuminemia; and use of aspirin or other blood thinners or anticoagulants.

Patients were divided into four groups according to hernia repair technique: suture repair (primary and Mayo's repair), mesh repair (prolene mesh or Ventralex Hernia Patch (VHP) repair). Umbilical hernia- as were divided into three groups based on their size according to the European Hernia Society recommendations: small UH (less than 2 cm), medium (between 2 and 4 cm in size) and large (larger than 4 cm) [6]. Small hernias were repaired by suturing only while mesh repair was used for medium size and large hernias. Local anesthesia was used in patients who underwent primary repair, Mayo's repair or a hernia repair using the VHP while spinal anesthesia was used in patient who underwent an umbilical hernia repair procedure with prolene mesh.

Parameters assessed at the baseline included sex, age, body mass index (BMI), presence of comorbidities, size of hernia defect, hernia repair techniques, postoperative complications, and postoperative recurrences rates by repair technique. Patients with a BMI of 30 or higher were considered obese. All surgical procedures were performed by two general surgeons (HÖ, AHG). Follow-up assessments including physical examinations and/or ultrasound scans were performed at postoperative Week 1 and Month 6 to evaluate potential recurrences

(postoperative month 6) and other complications (postoperative week 1) If an ultrasound examination could not identify hernia recurrence (obese patient or uncertain image), an abdominal wall computed tomography scan was performed.

Repair technique

Repair techniques used in this study included suture-only repair and mesh repair. All patients received a first generation cephalosporin intravenously at a dose of 1 g during induction anesthesia. Suture-only repair techniques included primary suturing or Mayo's repair while mesh repair was performed with a prolene mesh or Ventralex mesh.

A sub-umbilical crescent -shaped curved skin incision was performed in all procedures, regardless repair techniques. Incision was deepened up to the anterior rectus sheath. The hernia sac was dissected from the surrounding tissues and its content was pushed into the abdominal cavity. Excess sac was excised. Dissection was continued to allow adequate exposure of the intact fascia. A larger exposure of the intact fascia was provided in patients who underwent mesh repair with prolene to allow better mesh placement and fixation and thus further dissection was needed in these cases. Then, hernia defects were closed with separate stitches using 0- polypropylene, in cases of primary suture repair.

In cases of Mayo's repair, defects were closed by putting separate U-shaped stitches with 0 - polypropylene, using the imbrication method i.e. overlapping the fascia at one end of the defect to the other end. In mesh repair with prolene hernia defect was closed as with primary suturing technique and then the mesh was placed. The mesh was fixed to the intact fascia with 2-0 polypropylene sutures about 3 cm beyond the edges of the defect and a hemovac drain was placed into the surgical site.

In our study, hemovac drains were only used in patients who underwent hernia repair with prolene mesh and the drain was removed when daily drainage amount fell below 25 cc. In patients who underwent mesh repair with Ventralex Patch, the patch was placed into the hernia defect, i.e. into the peritoneal cavity. For the closure of the defect, the Ventralex mesh was fixed to the fascia with stiches placed at 3, 6, 9 and 12 o'clock positions

Statistical analysis

Data were analyzed using the SPSS (Statistical Package for Social Sciences, Windows Version 22.0) software. In addition to descriptive statistics (mean, standard deviation), one-way analysis of variance was used for intergroup comparisons and the chi-square test was used for the comparisons of quantitative data. A p value of <0.05 was considered significant.

Table 1. Intergroup comparisons for clinical and demographic variables.

	Primary repair group n:25	**Mayo's repair group n:69**	**Repair with prolene mesh group n:38**	**Repair with Ventralex hernia patch group n:21**	**p**
Age (years)*	44.52±10.7	49.33±13.34	49.84±12.47	47.1±10.65	F:1.19; p=0.313
Male/female	13 (52%)/12 (48%)	20 (29.0%)/ 49 (71%)	14 (36.8%)/ 24 (63.2%)	10 (47.6%)/ 11 (52.4%)	χ^2:5.31; p=0.152
Body mass index, kg/m²*	27.84±5.04	26.84±5.63	29.03±5.19	27.10±5.81	F:1.38; p=0.249
Diabetes mellitus	6 (24%)	17 (24.6%)	9 (27.3%)	6 (28.6%)	χ^2:0.195; p=0.968
Hypertansion	4 (16%)	15 (21.7%)	16 (42.1%)	6 (28.6%)	χ^2:6.95; p=0.073
Obesity	7 (28%)	20 (29%)	18 (47.4%)	7 (33.3%)	χ^2:4.2; p=0.24
Hematoma	0	3 (%4.3)	0	0	χ^2; 3.725 p=0.293
Infections	1 (%4)	5 (%7.2)	2 (%5.26)	1 (%4.8)	χ^2; 0.466 p=0.926
Seroma	0	4 (%5.8)	12 (%31.58)	2 (%9.5)	χ^2;20.174 p<0.001
Recurrence	4 (16%)	3 (4.3%)	0	0	χ^2; 10.311 p=0.016

*Values are presented as meanstandard deviation.

RESULTS

A total of 234 patients were enrolled in the study. The reason for exclusion was an incarcerated-strangulated hernia in 13 patients, a recurrent hernia in 9, and any concurrent pathological condition requiring surgical intervention in addition to umbilical hernia in 33 patients, and known kidney failure and/or being on aspirin or an anticoagulant and/or having an ASA 3 or higher anesthesia category in 26 patients. In this study the average defect size was 2.8 cm (range: 1 to 7 cm). No statistically significant differences were found among the Primary Repair, Mayo's Repair, Repair with Prolene Mesh and Repair with VHP Mesh groups in the mean age, sex, the mean BMIs, and the presence of DM, HTN or obesity (p=0.313, p=0.152, p=0.249, p=0.968, p=0.073, p=0.24, respectively) (Table 1).

BMI values ranged from 18.5 to 24.9 in 50 patients (32.7%), from 25 to 29.9 in 51 patients (33.3%), from 30 to 34.9 in 35 patients (22.9%) and from 35 to 39 in 17 patients (11.1%). 52 patients (33.9%) were categorized as obese.

Postoperative hematoma was only detected in 3 patients (4.3%) from the Mayo's Repair group. The hematomas were small size and did not require any intervention, patients were monitored and hematomas spontaneously resolved. Superficial surgical site infections were observed in 1 patient (4%) who underwent primary hernia repair, in 5 patients (7.2%) who underwent Mayo's repair, in 2 patients (5.26%) who underwent hernia repair with prolene mesh and in 1 patient (4.8%) who underwent hernia repair with VHP. These 9 patients recovered from infection following antimicrobial treatment.

No statistically significant differences were found among the Primary Repair, Mayo's Repair, Repair with Prolene Mesh and Repair with VHP Mesh groups in the incidence of infections or hematomas at the surgical site (p=0.341 and p=0.93, respectively). In the postoperative week 1 follow-up visit, seromas were detected in 4 patients (5.8%) who underwent Mayo's repair, in 12 patients (31.58%) who underwent hernia repair with prolene mesh and in 2 patients (9.5%) who underwent hernia repair with VHP. The incidence of seroma formation was significantly higher in the Prolene Mesh group than the other groups (p<0.001). These seromas spontaneously resolved and did not require any surgical interventions.

In the postoperative month 6 follow-up visit, recurrence rate was significantly higher in the Primary Repair group than the other three groups (p=0.016). Recurrence occurred in 4 out of 25 patients (%16) who underwent primary repair and 3 out of 65 (4.3%) patient who underwent Mayo's repair. No recurrence occurred in those who underwent hernia repair with prolene mesh or VHP.

DISCUSSION

Hernia repairs are usually among the most commonly performed surgical procedures in general surgery clinics. Inguinal hernias account for 83% of all hernias while femoral hernias account for 6%, incisional hernias account for 5%, umbilical hernias account for 4%, epigastric hernias account for 5% and other types of hernia account for 1% of all hernias [3,7]. In a study conducted by Kamer E. concomitant umbilical hernia was detected in 64 out of 745 patients with cholelithiasis (8.59%)[8]. Patients with cholelithiasis were excluded from this study.

The mean age of study subjects and female predominance in this study were in line with those reported from previous studies[6,9]. In our study, 39 patients (25.4%) had diabetes mellitus and 46 (30%) patients had hypertension. These rates were higher than those reported in the literature[6]. In our patients, the average defect size was 2.8 cm (range: 1 to 7 cm), which is similar to that reported from other studies in the literature[6].

52 (33.9%) patients in this study were obese (BMI≥30) Obesity has been reported at higher rates (67 to 76%) in other studies in the literature[9]. In another study, the mean BMI was reported as 30.4 kg/m^2 in patients who underwent suture-only repair, 36 kg/m^2 in patients who underwent open repair with mesh and 28.9 kg/m^2 in patients who underwent laparoscopic repair with mesh. In our study BMI was lower in patients who underwent suture-only repair and mesh repair and ranged from 26.8 kg/m^2 to 29 kg/m^2 in these patients. Recurrence rates lower than those reported in the literature may be interpreted by lower BMIs in our study.

Hematomas occurred in 3 patients. These patients were from the Mayo's repair groups. In the literature, the rate of hematoma formation has been reported as 1.4% in patients undergoing primary repair and 1.9% in patients undergoing open repair with prolene mesh[6]. Hematoma formation in patients who underwent Mayo's repair might be related inadequate

bleeding control while routine use of a hemovac in hernia repair surgery with prolene mesh might prevent hematoma formation.

Surgical site infections have been reported at various rates in the literature. In another study, although the rate of surgical site infection was reported as high as 11.5% with primary repair and Mayo's repair, no cases of surgical site infection were reported in cases of hernia repair with mesh[10]. In a series of 51 patients with epigastric or umbilical hernia, Hadi HI et al. performed hernia repair with VHP and 2 patients (3.92%) developed surgical site infection[11]. In another study, surgical site infections were reported in 1.4% of patients who underwent suture–only repair, in 9.6 % of patients who underwent hernia repair with prolene mesh and in 5.5% of patients who underwent laparoscopic hernia repair with mesh. In our study, 4% of patients who underwent primary repair, 7.2% of patients who underwent Mayo's repair, 5.26% of patients who underwent hernia repair with prolene mesh and 4.8% of patients who underwent hernia repair with VHP mesh developed surgical site infections and these rates were consistent with the rates reported in the literature.

Seroma formation has been reported in 3.4% of patients who underwent suture-only repair and in 7.7% of patients who underwent open surgery with prolene mesh[6]. In our study, seroma formation was observed in 5.8 % of patients who underwent Mayo's repair, in 31.58% of patients who underwent hernia repair with prolene mesh and in 9.5 % of patients who underwent hernia repair with VHP mesh. When compared to other repair techniques, higher rates of seroma formation in patients who underwent hernia repair with prolene mesh were considered to be related to more extensive surgical exploration across the intact fascia, in comparison to other techniques. The most common complication of hernia repair with prolene mesh was the formation of seromas.

In the literature, there are a number of studies conducted on recurrence rates. In a study conducted by Sanjay P. et. al[10] in 100 patients, the recurrence rate in primary repair and Mayo's repair was found to be 11.5% while no recurrences were reported in patients who underwent mesh repair. In a study conducted by Lau H. et.al. in 102 patients, the recurrence rate after 2 years of follow-up was reported as 8.7% in primary repair while no recurrence was reported in patients who underwent Mayo's repair, mesh repair or laparoscopic repair[12]. In another series of 51 patients with epigastric or umbilical hernia who underwent hernia repair with VHP mesh, hernia recurrence was reported in one patient (1.96%)[12]. In a study conducted by Martin DF. et.al. in 88 patients, 66% of patients had umbilical hernia and all patients underwent hernia repair with VHP mesh and none of the patients developed recurrence[7]. In a study conducted by Garcia-Urena MA., recurrence rate was reported as 15% in patients who underwent Mayo's repair[13]. In another study, no recurrence was reported in 21 patients who underwent umbilical hernia repair with mesh[12]. In a series of 200 patients, Aroyo A. et al. compared mesh repair and primary repair to each other and detected a recurrence rate of 1% in patients who underwent mesh repair and a recurrence rate of 11% in patients who underwent primary repair[14]. Unlike other studies, recurrence rate was reported as 12.2% in patients who underwent suture-only repair, 18.4% in patients who underwent open hernia repair with mesh and 6.7% in patients who underwent laparoscopic hernia repair with mesh in a study with an average follow up time of 5 years[15]. In our study, recurrences occurred in 7 patients (4.57%). 4 of these patients had primary repair and 3 had a Mayo's repair procedure. We did not detect recurrences in patients who underwent hernia repair with VHP mesh or prolene mesh. Our study results were similar to the results from studies with limited follow-up period. However, recurrence rates were significantly lower than previous long term studies, particularly in the group of patients who underwent open repair with prolene mesh.

In our study, in 3 out of 7 cases of recurrence, BMI values were in a range between 30 kg/m² and 34.9 kg/m² and in the other four cases of recurrence, BMI values ranged from 25 to 29.9 kg/m². In a study conducted by Sinha SN et al., 26 out of 34 (76%) study subjects were obese and the average BMI was reported as 33 kg/m²[10]. In another study, 64 patients underwent repair surgery for umbilical hernia and BMI was ≥ 30 kg/m² in 43 out of 64 (67.2%) patients and BMI was<30 kg/m² in the remaining 21 patients. While recurrence was observed in 3 (7%) out of 43 patients with BMI ≥ 30 kg/m², hernia recurred in 1 out of 21 patients with BMI <30 kg/m²[8]. In our study, the rate of obese patients was lower than the rates reported in the literature while recurrence rates were in line with those reported in the literature, in patients with a BMI value between 30 and 34.9 kg/m². However in the subgroup of patients with a BMI value between 25 and 29.9 kg/m², the recurrence rate was higher than that reported in the

literature. A number of factors have been implicated in recurrences following umbilical hernia repair. However, in very few studies, a multivariate analysis could demonstrate an independent factor. Formation of a large seroma, diabetes or classical complication such as surgical site infections may result in a recurrent hernia. Potential risk factors include obesity and excessive weight gain following repair. A BMI > 30 kg/m² and hernia defects larger than 2 cm have been reported as being risk factors for surgical failure[16]. In addition, smoking may increase the risk for recurrences[17].Antibiotic prophylaxis is associated with a decreased rate of surgical site infections. Local anesthesia may be used in patients with small umbilical hernia and an acceptable BMI[16]. Recently laparoscopic techniques have come to the forefront in the umbilical hernia repair. The most important limitations of this study are short follow up time and small sample size.

In our study the rate of recurrences following umbilical hernia repair was found to be 4.57%. No recurrences occurred following umbilical hernia repair with prolene or VHP mesh. The Mayo's repair was the most commonly used surgical repair technique in this study. In view of low complication and recurrence rates along with low medical costs associated with Mayo's repair surgery, this technique may be considered as appropriate for the repair of umbilical hernias defects 2cm and less, in size. Higher rates of recurrences associated with primary repair should be taken into the consideration when planning the treatment. We believe that Mayo's repair or hernia repair with VHP mesh should be preferred over primary repair of small defects. However, hernia repair with VHP mesh is a costly procedure. In umbilical hernia repair; hernia repair with mesh appears to be superior over non-mesh/tissue-suture repair. However, further randomized controlled studies are needed to determine the technique of choice.

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