THE NEW ZEALAND MEDICAL JOURNAL
Journal of the New Zealand Medical Association

Two different prosthetic materials in the treatment of large abdominal wall defects

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Abstract

Aims The use of prosthetic material is a well-accepted practice for the treatment of large ventral defects. The aim of this study is to present the effectiveness of two different prosthetic materials for large ventral defects.

Methods In this retrospective 3-year study, 41 patients (17 males, 24 females) underwent surgical correction of large abdominal wall defects. Two subgroups were formed based on the possibility of peritoneal preservation. In the first group (24 patients) the bifilament polypropylene mesh was used, while in the second group (17 patients) the expanded polytetrafluroethylene patches were used.

Results The mean hospitalisation time was 7.8 days (SD 9.2 days) for the first and 10 days (SD 4.2 days) for the second group (p=ns). Group A presented the following complications: Two seromas, 1 fistula, 2 wound infections. Removal of the mesh was necessary in one case. Two recurrences were noticed during the 5-year follow-up period. Group B presented a seroma and an infection, but no recurrences. As for complications, no statistical difference exists between the two groups. Furthermore, 5 patients (20.83%) from group A complained of abdominal discomfort due to stiffness, especially when they were bending (p=0.029).

Conclusions Both prosthetic patches are safe and effective when used in the repair of large abdominal wall defects. Operative complications are within acceptable limits, and the reherniation rate is low.

During the last decade the basic principles of tension-free repair of hernias are well established.[1–6] Repair of large abdominal hernias has a high recurrence rate, especially when these are recurrent hernias.[6,7] The recurrence rate is lower when prosthetic materials are used.[6,7] A prosthetic device must be used to repair ventral hernias in patients with insufficient tissue for a tension-free primary closure. The use of prosthetic mesh material is now a well-accepted practice.[5,7]

The aim of this study is to present the effectiveness of two different prosthetic materials for the treatment of large ventral defects.

Methods

The present retrospective study included 41 consecutive patients (17 males, 24 females) that underwent surgical intervention for the correction of large abdominal wall defects. The patients were divided into two groups. The criterion for the separation of the groups was the possibility of preservation of the peritoneum.

The first group (A) consisted of 24 patients (9 males, 15 females) and a bifilament polypropylene mesh (Prolene, Ethicon Inc) was used. The second group (B) included 17 patients (8 males, 9 females) and

expanded polytetrafluroethylene patch (e-PTFE, Gore-Tex) was used. The localisation of the wall defects is presented in Table 1.

According to the cause, the defects were classified as primary and recurrent ventral hernias; laparostomies; and real defects due to shotgun trauma (Table 2). The characteristics of the patients are presented in Table 3. In Table 4 the Chevrel classification of the hernias is presented.

The same surgical technique was applied in both groups by the same team of surgeons. The prothesis, larger than defect, was fixed by two rows of non resorbable sutures. Table 5 presents the ratio between the abdominal defect and the prothesis, as well as their dimensions. The first, of full thickness U stitches, was sutured circumferentially 4–5 cm from the defect edges, while the second row of a running suture was approximating the defect edges to the prosthetic material.

The polypropylene mesh was put in the preperitoneal space, while the e-PTFE was fixed intraperitonealy. A single dose of antibiotic prophylaxis was administrated to all patients 30 minutes before operation. A 5-year follow-up period was completed for all patients. The follow-up included regular visit to the outpatient department at the 6^{th}, 12^{th}, 24^{th}, 36^{th}, 48^{th}, and 60^{th} month. Complete physical examination was performed to every patient. The t-student test was used for the statistical analysis and the sensitivity was set at $p<0.05$.

Table 1. Localisation of hernias

Location	Group A	Group B
Midline		
Upper abdomen	2	3
Lower abdomen	12	9
Upper and Lower abdomen	6	3
Lateral abdomen		
Upper abdomen	1	0
Lower abdomen	3	2

Table 2. Classification of the defects by cause

Defects	Group A	Group B
Ventral hernias		
Primary	6	6
Postoperative	11	5
Recurrent	5	
Trauma	1	3
Laparostomies	1	3
Total	24	17

Table 3. Epidemiologic characteristics of the groups

Variables	Group A (n=24)	Group B (n=17)
Sex		
Male	9	8
Female	15	9
Age (years)	57.4±10	55±17
BMI (kg/m^2)		
<25	18	3
25–30	4	10
>30		4

Table 4. Chevrel classification of hernias

Chevrel classification		Midline hernias	Lateral hernias
Type 1 (<5 cm)	**A**	0	0
	B	0	0
Type 2 (5–10 cm)	**A**	14	6
	B	8	2
Type 3 (10–15 cm)	**A**	2	1
	B	3	2
Type 4 (>15 cm)	**A**	1	0
	B	2	0
Total		**30**	**11**

Table 5. Hernias' and mesh's dimensions

Dimensions	Group A	Group B
Abdominal wall defect (cm^2)	62±18	101±35.2
Mesh (cm^2)	176±29.5	289±135
Ratio	1:2.8	1:2.8

Table 6. Complications presented with each mesh

Complications	Group A (n=24)	Group B (n=17)	P value
	n (%)	n (%)	
Abdominal discomfort	5 (20.83)	–	0.029
Seroma	2 (8.3)	1 (5.56)	ns
Mesh infection	2 (8.3)	1 (5.56)	ns
Chronic discharging fistula	1 (4.17)	–	ns
Removal of the mesh due to mesh infection	1 (4.17)	–	ns
Recurrence	2 (8.3) (1 due to removal of the mesh)	–	ns

ns=not significant.

Results

There was no mortality both in group A and B, while the mean hospitalisation time was 7.8±9.2 days and 10.0±4.2 days respectively (p=ns). The complications presented in both groups are displayed in Table 6. It is worth noticing that only two patients had a recurrent hernia during the 5-year follow-up period. There is no significant difference concerning complications between the two groups. It is important though to mention that in group A, in which a bifilament polypropylene mesh was used, a discomfort to the abdomen appeared in 5 cases (p=0.029).

Discussion

The use of meshes in hernia repair is nowadays broadly accepted.[1–6] Biotechnology offers a broad spectrum of biomaterials and their variety lies both in their composition and design. In the present study, two of the most frequently used meshes, bifilament polypropylene and expanded PTFE, were employed.

Theoretically, the best way of repairing ventral defects is the direct suturing of the abdominal wall. Unfortunately, this is probably successful only in very small defects (Type 1 of Chevrel classification). Direct suturing of large defects creates tension at the suture line, which leads to a high percentage of recurrence, reaching 30–54%.[7–11] Furthermore, in many cases of large defects direct suturing is impossible.

The use of prosthetic material permits closure of large defects. Additionally, the absence of tension reduced the recurrences to <10%.[12–17] The propylene mesh is the most widely used biomaterial. Clinical experience demonstrated a wide variety of complications associated with the different type of meshes; such complications include the development of adhesions, fistulas, infections, persistent pain.[11,18–20]

In a literature review, Cassar et al[11] reported an infection rate after incisional hernia repairs, with and without prosthesis, ranging from 0 to 49%. The postoperative complications, for both groups, ranged within the bibliographic limits[6,11,21,22] and were confronted with success, meaning that in all but one case no removal of the mesh was necessary.

Law et al postulated that it is possible that the nature of the expanded polytetrafluroethylene contains the infection and makes it easier to treat.[18]

At this point it is worth commenting on the component separation (CS) technique. This technique uses a sliding myofascial flap to provide tension-free closure of large abdominal wounds without implantation of mesh.[23] Ramirez et al[24] first reported CS for hernia repair in 1990. Several subsequent case series have reported on its utility for the repair of ventral abdominal defects.[25,26] Anecdotally, several patients have been seen with very stiff abdominal walls after large mesh implantation. These patients are impaired in some of their activities of daily living.

CS allows the surgeon to avoid this potential adverse outcome.[27] With CS becoming a more mainstream technique, a decision must be made as to where it fits into an abdominal reconstruction algorithm. Indications, contraindications, and timing of repair need to be addressed.

Discomfort at the abdominal wall, due to stiffness, appears to be a very common patient complaint when bifilament polypropylene mesh is employed. Several authors have suggested that up to 50% of patients (who underwent mesh repair of an incisional hernia) complained due to reduced mobility of the abdominal wall.[28,29]

On the other hand, Burger et al[25] suggested that discomfort following incisional hernia repair is caused by tension on the abdominal wall and that the relative decrease in pain after mesh repair may be caused by the tension-free repair. In the present study, 21% of group A patients (5 out of 24) complained. The above-mentioned percentage is compatible with bibliographic data.[28–30]

In summary, our long-term clinical experience, as well as the findings of other authors, indicate that prosthetic patches are safe and effective when used in the repair of large abdominal wall defects. Operative complications with these materials are within acceptable limits, and the reherniation rate is low.

Of course, further investigation is necessary and double blind prospective trials are required for a complete evaluation of the patches.

Competing interests: None known.

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