

KARIN KESİLERİNİN POLYDIOXANONE KULLANILARAK DEVAMLILIK KİTLESEL KAPAMA TEKNİĞİ İLE KAPATILMASI

ABDOMINAL WOUND CLOSURE WITH POLYDIOXANONE BY CONTINUOUS MASS CLOSURE TECHNIQUE

Mehmet İ. YILDIRGAN, Sabri S. ATAMANALP, Mahmut BAŞOĞLU, Ahmet A. BALIK
Bedii SALMAN, Durkaya ÖREN

From the Department of Surgery and Department of Pediatric Surgery Atatürk University Hospital, Erzurum, Türkiye

Özet

Polydioxanone ile devamlı kitlesel kapama tekniğinin etkinliğini araştırmak üzere karın ameliyatı geçiren 3646 hastada klinik bir çalışma gerçekleştirildi. 2098 hastada kesi, polydioxanone kullanılarak devamlı - kitlesel kapama tekniği ile kapatıldı. 1548 hasta ise periton için kromik katgut veya vicryl, fasia için ipek kullanılarak, tek tek tabaka tabaka kapama tekniği ile kapatıldı. polydioxanone grubunda yara açılması (sıra ile %1,1 ve %3,4 $p < 0,0001$), sinüs oluşumu (sıra ile %1,1 ve %6,3 $p < 0,0001$), fıtıklaşma (sıra ile %2,4 ve %4,9 $p < 0,0001$) ve yara yeri enfeksiyonu oranı (sıra ile %12,8 ve %15,4 $p < 0,05$) diğer gruptakilerden daha azdı. Ortalama kapama zamanı polydioxanone grubunda medyan (sıra ile 16,9 ± 4,1 dk. ve 24,1 ± 5,9 dk, $p < 0,005$) ve paramedyan (sıra ile 19,3 ± 4,1 dk. ve 29,2 ± 5,6 dk, $p < 0,005$) kesiler için daha kısa bulundu. Kullanılan malzemelerin ortalama fiyatı, aynı firmanın ürünleri ile karşılaştırıldığında, polydioxanone grubunda medyan (sıra ile 6,4 ± 1,2 £ ve 9,5 ± 1,8£, $p < 0,005$) ve paramedyan (sıra ile 7,9 ± 1,6 £ ve 12,3 ± 2,0£, $p < 0,05$) kesiler için daha ucuz bulundu.

Anahtar kelimeler: Kesi, Kapama, Polydioxanone.

Summary

To investigate the efficiency of the abdominal incision closure with polydioxanone by continuous mass closure technique, a clinical study was performed in 3646 patients with abdominal operations. In 2098 patients, the incision was closed with PDS by continuous mass closure technique. In 1548 patients layered technique was used, employing chromic catgut or vicryl for peritoneum and silk for fascia. In PDS group dehiscence (1.1 % vs 3.4 %, $p < 0.0001$), suture sinus (1.1% vs 6.3 %, $p < 0.0001$), hernia (2.4 % vs 4.9 %, $p < 0.0001$) and infection rate (12.8 % vs 15.4 %, $p < 0.05$) were less than those in the other group. The mean closure time was shorter in PDS group for both median (17.4 ± 5.2 minutes vs 23.8 ± 6.4 minutes, $p < 0.005$) and paramedian (18.8 ± 4.9 minutes vs 28.6 ± 6.6 minutes, $p < 0.005$) incisions than that of the other group. The mean cost of the used materials was cheaper in PDS group for both median (6.4 ± 1.2 £ vs 9.5 ± 1.8£, $p < 0.005$) and paramedian (7.9 ± 1.6 £ vs 12.3 ± 2.0£, $p < 0.05$) incisions.

Key words : Incision, closure, polydioxanone

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Introduction

Continuous mass closure of the abdomen by monofilament material was first described by Pollock et al (26). This technique is more economical than layered wound closure, and closure time is shorter (33). Polydioxanone is a synthetic absorbable monofilament suture material (23,28,30). It has long absorption period by hydrolyses (30). Its linear resistance is high and tissue reaction is low (8,18,32). In this study prospective the efficiency of PDS in abdominal wound closure has been determined.

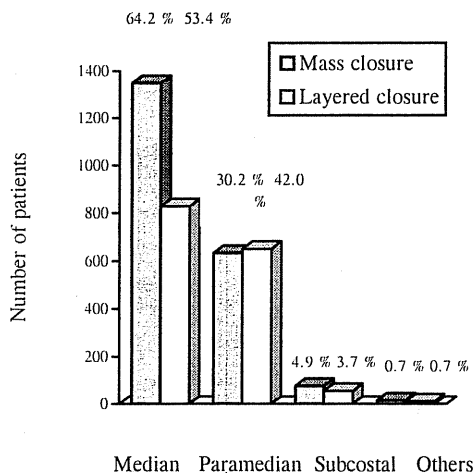
Material and Methods

This study includes 3646 patients who underwent abdominal surgery between December 1988-December 1995. In 2098 patients, wound was closed with PDS (0/0 or 1/0) by continuous mass closure technique, in 1548 patients by layered technique using chromic catgut (2 /0) or vicryl (2/0) for peritoneum, silk (2/0) for fascia and normal catgut (3/0) for muscle (control group). In both groups, if necessary subcutaneous tissue was closed by normal catgut and skin was closed by silk. All materials have been produced by Ethicon (Ethicon® inc. New Jersey U.S.A.). Before operation patient were evaluated with respect to some risk factors such as smoking (over 10

Table 1. Possible Risks Factors

Risks factors	Mass closure	Layered closure	P
Obesity	620(29.5%)	351(22.6%)	<0.0001
Smoking	880(41.9%)	542(35.0%)	<0.0001
Chemotherapy	19(0.9%)	14(0.9%)	>0.5
Hypoproteinemia	384 (18.3%)	313 (20.2%)	<0.05
Malign disease	461 (21.9%)	311 (20.0%)	>0.05
Concomittant illness	401 (19.1%)	297 (19.2%)	>0.5
Corticosteroid therapy	17 (0.81%)	10 (0.64%)	>0.5
Radiotherapy	11(0.52%)	9(0.58%)	>0.5
Emergency case	1098(52.3%)	800(51.6%)	>0.5
Infected case	198(9.4%)	115(7.4%)	<0.05

cigarettes/day), age (over 70 years), hypoproteinemia (lower than 6mg/dl), malignity, radiotherapy (last 3 weeks prior to operation), chemotherapy, corticosteroid treatment and concomitant illness. Early postoperative follow up was performed during hospitalization, whereas late postoperative follow up last 6 months after the operation and the findings, (infection, wound dehiscence, sinus formation and herniation) were reported. The duration of the closure was reported in 80 patients in each group who had a wound length 20 ± 1 cm. The costs of the materials were compared using the products of same company. Statistical analysis was performed by student t- and Chi-squared tests.

Figure 1. The Type of Incisions and Number of Patients

Results

There were 1198 male (57.1%) patients in PDS group, 820 male (52.9%) patients in control group. The mean age was 47.6 ± 18.8 years (range 1-95) in PDS group and 37.9 ± 23.4 years (range 0-87) in control group. The differences between the ages were statistically significant ($p < 0.001$). The type of incisions in both groups are shown in Figure 1. The risk factors are summarized in Table 1. The

rate of obesity, hypoproteinemia, smoking, infected case in PDS group were significantly higher than control group. There were no differences between the groups in the other risk factors. In PDS group, 1248 patients (59.4%) were followed up, and in control group 924 (59.6%) patients were followed up, and there was no significant difference ($p > 0.05$). The mean follow up time in PDS group was 30.2 ± 11.6 months and control group 32.2 ± 12.1 months (range 6-48 months in both group). There were no significant differences between follow-up time in both groups ($p > 0.05$). The complications were summarized in Table 2. All complications were significantly lower in PDS group than control group. The mean closure time of median incisions was 17.4 ± 5.2 minutes in PDS group and 23.8 ± 6.4 minutes in control group. The mean closure time of paramedian incisions were 18.8 ± 4.9 minutes and 28.6 ± 6.6 minutes in PDS and control groups respectively. The differences were significant for both incisions ($p < 0.005$ and $p < 0.005$ respectively). The cost of closure of median incisions in PDS and control groups were 6.4 ± 1.2 £ and 9.5 ± 1.8 £ respectively whereas cost of the paramedian incision in both groups were 7.9 ± 1.6 £ and 12.3 ± 2.0 £. When the comparison was made between the products of same company, the cost of the closure of the both incisions was lower significantly in PDS group than control group ($p < 0.005$).

Discussion

To improve an ideal suture material and method for abdominal wound closing, many studies have been carried out for many years (3,4,11,13,17,20,25,30). An ideal suture material have not been found yet (7). But continuous mass closure technique with monofilament suture material is most preferred (6,11,13,16,19,24). Continuous wound closures have superior bursting strength because stresses upon the wound are distributed a

Table 2. Complications

Complications		Mass closure	Layered closure	P
Early	Wound dehiscence	24 (1.1%)	53 (3.4%)	<0.0001
	Wound infection	269 (12.8%)	239 (15.4%)	<0.05
Late	Suture sinus	23 (1.1%)	98 (6.3%)	<0.0001
	Hernia	52 (2.4%)	77(4.9%)	<0.0001

long the length of the suture (27). This may be due in part to the use of fewer knots (35). Wound infection and sinus formation could be prevented by using monofilament material instead of organic material such as silk and cotton. Foreign body reaction could be prevented by using absorbable material (30). PDS has a retention period as long as 180 days (15) and has few sinus formation (21,31). Rapidly absorbed materials such as catgut are associated with high rates of dehiscence (17). Polyglactin and polyglycolic acid are more durable, but are associated with a higher early failure rate than permanent suture such as nylon, polypropylene, or polybutester (33). Although in vitro and in vivo studies about suture materials have been going on, the preference of suture material and technique is due to surgeon's habits (30). Ideal suture materials must have a smooth surface, moderate elasticity, swelling rate under 50% , high linear and knot resistances, long absorption period and low tissue reaction (2, 7, 23). It has been shown that incised abdominal layers need 4-8 week after injury, in order to reach 20-80 % of their original strength (7,13). Thus the suture materials must keep their strength about 8 weeks . Catgut is absorbed in 3 weeks . Polyglactin retains sufficient strength about 4 weeks, while PDS 8 weeks (18, 32). The rate of wound dehiscence in abdominal incision closed with PDS was reported between 0 % and 0.8 % (5,12,14,24,30). These rates in our study were 1.1 % in PDS group and 3.4 % in control group. Wound infection is the very important factor in the development of wound dehiscence and incisional hernia (16). Some microorganisms show low affinity to PDS (9). The infection rate in incisions closed with PDS group has been reported to be 5-10% (5,24,34) . These rates in our study were 12.8% in PDS group and 15.4% in control group. Although the comparison is difficult without performing classification of infection risk groups, the rate of infection was lower in PDS group . In contaminated wounds PDS is superior to other materials because hydrolysis PDS isn't effected from infectious medium, while the absorption of other absorbable materials such as catgut is increased by enzymatic reactions in infectious medium (2,30) . Tissue reaction to PDS is minimal (8). The rate of sinus formation was reported between 0-8% (5,14,24,34). Our associated findings were 1.1% in

PDS and 6.3% in control group. The incidence of incisional hernia was reported to be between 1 and 20% (5,14,22,24,30,34). With a mean follow-up of 12.4 months, this rate was found 2.4% in PDS group and 4.9% in control group. Prolonged anesthesia related to closing time may cause problems especially in those patients with risk group (1,29). Cruse et al (10) demonstrated that the wound infection rate increased in proportion to the duration of surgery. Similarly, the time of surgeons is very valuable and very limited. Closing time was significantly shorter in PDS group than control group ($p < 0.005$ for both median and paramedian incision). The cost of suture materials is another important criterion (1). In our series the cost is significantly lower in PDS group than control group ($p < 0.005$ for both median and paramedian incisions). However, this rate may be change with using local and cheap products. In conclusion abdominal incision closure with PDS by continuous mass closure technique is superior to layered closure technique because it cause less dehiscence, sinus formation and incisional hernia even for high risk patients. This technique get advantages to patient and surgeon by shortening closure time. It is also cheaper. Therefore, we recommend it for routine closure.

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Correspondance address:

M. İlhan YILDIRGAN

Department of General Surgery Atatürk University

School of Medicine 25240 Erzurum / TURKEY

Telephone:0 90 442 2331122/1610

Fax: 0 90 442 2186782