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RANDOMISED PROSPECTIVE STUDY OF MIDLINE ABDOMINAL WOUND CLOSURE WITH DELAYED ABSORBABLE VERSUS NON-ABSORBABLE SUTURE.

Surgery

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ABSTRACT

Introduction Ideal closure of the abdomen after laparotomy is still a matter of great debate. It should be free from complications like wound dehiscence, incisional hernia and persistent sinuses. In any wound closure despite the personal skills of surgeon, the correct suture materials and its correct application are of immense importance. The common practice nowadays is the use of non-absorbable materials for fascial closure in single layer. But patients complain of wound pain, suture sinus, suture granuloma and puckering of abdomen1.

Aims and objective: To identify the ideal suture for single layer closure of abdominal fascial layer which not only reduces the incidence of incisional hernia but also has the propensity of reducing wound pain and suture sinus formation.

Materials and methods: The study was undertaken in the department of general surgery in Calcutta National Medical College for a period of 1 year after obtaining informed consent from all the patients. 110 patients were studied after a computer-generated randomization. 50 patients had undergone closure with polydioxanone representing closure with delayed absorbable material and 60 patients had undergone closure with polypropylene representing closure with non-absorbable materials .All patients were followed up at 2 weeks, 4weeks, 1year and 2years.

Statistical analysis: The Statistical analysis was done by calculating the P value.

Results It was found that the patients whose abdomen were closed with delayed absorbable suture material had less wound pain or problem of suture formation with lesser incidence of incisional hernia.

Conclusion: The ideal method of midline abdominal wound closure is single layer fascial closure with delayed absorbable suture material.

KEYWORDS

Midline closure, absorbable suture, non-absorbable suture, wound pain, suture sinus.

INTRODUCTION

Access to the abdomen through a midline incision is a common surgical practice and the disruption of an abdominal wound is a major disaster in the life of a patient and is also a nightmare to the surgeon. There are several documented techniques that can be used for wound closure like use of staples, use of a wide variety of sutures or the use of adhesives. All of these methods have their merits and demerits.

Staples are usually used for minor wounds and are easy to use requiring lesser expertise though it is very cost effective and has similar rates of infection as compared to sutures[11] while adhesives can be used for deeper as well as superficial uses and have a lesser rate of wound infection as compared to sutures and are also relatively painless[11]. Adhesives are usually used in the pediatric age group or for percutaneous gluing.

Even though all these techniques are known to us yet the technique of choice remains to be suturing. As no suture is ideal for every wound, and in most cases, several types of sutures are required to close the wound adequately[11], there are two types of sutures which are most commonly used in daily practice: absorbable and non-absorbable sutures. Both the sutures have different properties due to which several factors determine the choice a particular type. The type of the tissue, type of the surgery, the duration for which the suture should be in place, the desired cosmetic result and the motive of suturing (for e.g. suturing for hemostasis) are some of the very important factors determining the selection of a suture material.

While non-absorbable sutures are used in areas requiring constant mechanical support, absorbable sutures are used in areas where no such support is required and in areas where the wound tends to heal faster.

The integrity of sutured abdominal wound rests on the balance between the suture holding capacity of tissues and tissue holding capacity of sutures. After Dudley's masterpiece on establishing the concept of abdominal mass closure most of the surgeons now prefer it his way. In the guinea pig model he demonstrated that mean force per unit area at tissue suture interface was equal to the integral of the forces working on suture surface divided by radius of suture and thickness of tissues as follows[2]:

$$F_a = F_r / r \times L$$

F_a=force per unit area at tissue interface
F_r= integral of forces working on suture surface
r=radius of suture
L= length of suture.

Patients complain increase rate of suture related complains such as pain, suture sinus formation, puckering with non-absorbable material.

MATERIALS AND METHODS

This study was undertaken in CNMCH from May'09 to April'10, after taking informed consent from 110 patients who were randomly assigned. 50 of them underwent abdominal wall closure with delayed absorbable material and 60 with non-absorbable material. No.1 polydioxanone was chosen as the material for the delayed absorbable suture and polypropylene no.1 was used as the non-absorbable suture material in our study. A comparison has been made after the patients were followed up at 2 weeks, 1 month, 6 months and 2 years.

RESULTS

CHARACTERISTICS	PDS (n=50)	Prolene (n=60)
Gender		
Male	32	45
Female	18	15
O.T		
Emergency	26	36
Elective	24	24
Age (in years)		
0-20	4	6
20-40	16	14
40-60	17	26
>60	13	14
Type of surgery		
Peptic perforation	9	13
Ileal perforation	5	4
Appendicular perforation	2	3
Blunt trauma abdomen	4	5
Intestinal obstruction	6	8
Gastric carcinoma	9	8
Rectal carcinoma	4	3
Colonic carcinoma	6	7
Others (benign pathology)	5	9

FOLLOW UP AS NOTED

Complications	PDS n=50	PROLENE n=60
Early	4(8%)	5(8.3%)
• Wound infection	5(10%)	4(6.6%)
• Wound dehiscence		
Late		
• Suture sinus	0	2(3.3%)
• Suture granuloma	0	3(5%)
• Incisional hernia	0	1(1.6%)[button hole]
Patient's complain (On follow-up at 1m,6m, 1yr,2yr)		
• Pricking sensation	68%, 0, 0, 0	90%, 90%, 90%, 90%
• Puckering of abdomen	48%,12%,0,0	75%, 80%, 82%, 82%
• Wound pain	59%,0,0,0	70%, 60%, 26%, 26%

DISCUSSION

In this study 110 patients were selected who had undergone laparotomy through a midline incision. Among which 50 of them had undergone fascial closure with polydioxanone no.1 after random selection and 60 patients had undergone closure with polypropylene. Both early and late complications and patient's compliance were studied and it was found that polydioxanone or delayed absorbable suture materials were better than polypropylene or non-absorbable suture materials. Calsonna, Condon RE3 et al in 1995 had studied polyglyconate versus nylon suture and found more chances of buttonhole incisional hernias with the use of nylon sutures. It is a late complication, which was thought to be due to “Cheese Wire Effect” of permanent suture material against rectus sheath at the site of stitch penetration, ultimately creating multiple small incisional hernias.

Meta analyses of 3 large randomized or quasi-randomized trials with 1 year follow up further revealed that 40 (4.5%) of 891 patients in the PDS group developed chronic pain compared to 79 (8.7%) of 912 in nylon group4.

Table of Trials comparing polydioxanone with non-absorbable suture materials

Study	No. of patients (randomized)	Suture type	Incisional hernia	P-value
Krukowski etal6	757	PDS, Polypropylene	3.5%, 4.7%	NS
Wising etal7	747	PDS, nylon	13.2%, 10.4%	NS
Israelson et al8	813	PDS, nylon	15.1%, 15.7%	NS
Leaper et al9	233	PDS, nylon	1%, 0%	NS
Present study	110	PDS, PROLENE		NS

CONCLUSION

Keeping in mind the targets of wound management, which are prevention of infection, hemostasis, and better cosmesis it is safe to say from our study that delayed absorbable suture materials, are a better choice over non-absorbable suture materials for single layer fascial closure after midline laparotomy.

References

1. Van't Riet M Styerberg EW,Nellen Styer J et al.: Meta analysis of techniques for closure of midline abdominal incision.Br J Surg.Nov.2002;89(11):1350
2. Dudley,H.A.F: layered and mass closure of abdominal wall: theoretical and experimental analysis.Br.J.Surg.1970;57:664
3. Carlson MA,Condon RE .polyglyconate (Maxon) versus nylon suture in midline abdominal incision closure:a prospective randomized trial.:Am Surg Nov. 1995; 61(11)980-3
4. Shukla HS, Kumar S,Misra MC,Naithani YP.: Burst abdomen and suture material:a comparison of abdominal wound closure with monofilament nylon and chromic catgut.Indian J Surg. 1981;43:487
5. Wasiljew BK,Winchester DP.: experience with continuous absorbable suture in the closure of abdominal incision.Surg Gynecol Obstet. 1982;154:378.
6. Krukowski ZH,Cusick EL,Engeset J,Mathes on NA: Polydioxanone or polypropelene for closure of midline abdominal incision a prospective comparative clinical trial.Br.J Surgery.1987;74:828-30
7. Wising J, Van VroonhovenTH, JMV, Schattenkerk ME, Veen HF, Ponsan RJ, Jeekel J.: fascial closure after midline laparotomy: results of randomized trial. Br.J.Surg. 1987;74:738-41
8. Israelsson LA, Jonsson T.: Closure of midline laparotomy incision with polydioxanone and nylon the importance of suture technique. Br.J.Surg. 1994;81:1606-08
9. Leaper DJ, Pollock AV, EvanN: abdominal wound closure. A trial of nylon, polyglyconic acid and steel suture,Br.J Surg.1977;64:600-606
10. Sanz LE,Patterson JA,Kamath R ,WilletG, Ahmed SW,Butterfield AB: Comparison of Maxon suture with Vicryl, chromic catgut and PDS suture in fascial closure in rats .obset gynecol.1988;71:418-22
11. Hsiao T, Council M: Wound, Closure techniques. Stat pearls [internet]. Treasure Island (FL): StatPearls Publishing. 2018-2017 Nov.6