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Wound Closure In Orthopaedics Surgery : Sutures versus Staples

KEYWORDS: Orthopaedic Surgery, Staples, Sutures, Skin Closure

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ABSTRACT ***Background***

Surgical site infection(SSI) is defined as the occurence of the wound infection following surgery .Orthopaedic SSIs are frequent postoperative complications that represent 20% of all nosocomial infections .Various preoperative, intraoperative and postoperative strategies have been employed to reduce the incidence of SSIs. Preoperative strategies like prophylactic antibiotics administration and proper sterilisation of involved personnel and instruments .Postoperatively the measures like sterile dressing and has become proper sterile techniques during dressing change over .The method of skin closure during surgery is very important. Optimal closure of skin closure is to promote skin healing, acceptable cosmetic result and minimising the risk of dehiscence or infection. Most common methods are use of staples and sutures.

Objectives

The aim of this study is to compare suture and staples in terms of time of close wounds, incidence of wound complications, postoperative pain and scar formation.

Materials and Methods

In a parallel group of randomised controlled trial in the tertiary care hospital in department of orthopaedics, a total of 50 consecutive patients were taken in which (n=25) wounds were closed with sutures and (n=25) were closed with staples. Informed consent of the patients were being recruited for the study. The results were evaluated till 2-3 weeks of the wound closure and total of 6 weeks.

Results

Mean wound closure time was significantly less in staple group(3.44 v/s 10.75 mins, p<0.01).Mean pain score during suture removal was significantly more in staple group(VAS -3.71 v/s 2.53;p<0.05).Over wound complication rate in stapler and suture group was 40% and 16% respectively(p<0.12).

Conclusions

Use of stapler significantly reduces wound closure time, but also associated with significantly increased pain and more composite wound morbidity. Cost analysis, also supports the use of sutures should be preferred, as the cost is five times, more with staples.

Background

Surgical site infection(SSI) is defined as the ooccurence of the wound infection following surgery [1,2] .Orthopaedic SSIs are frequent postoperative complications that represent 20% of all nosocomial infections [1] .Various preoperative, intraoperative and postoperative strategies have been employed to reduce the incidence of SSIs [1].Preoperative strategies like prophylactic antibiotics administration and proper sterilisation of involved personnel and instruments [3] .Postoperatively the measures like sterile dressing and has become proper sterile techniques during dressing change over [3] .The method of skin closure during surgery is very important [4,5,6] .Optimal closure of skin closure is to promote skin healing, acceptable cosmetic result and minimising the risk of dehiscence or infection [4].Most common methods are use of staples and sutures [4,7,8].Yet ,there seems to be no consensus in the literature as to which closure method is superior. Some studies reporting no difference and others reporting a higher wound complication rate following the use of staples [6,12-15].

Objectives

The aim of this study is to compare suture and staples in terms of time of close wounds, incidence of wound complications, postoperative pain and scar formation. It also has a objective to assess which is better mode of closure in order to avoid complication and review the literature.

Materials and Methods

In a parallel group of randomised controlled trial in the tertiary care hospital in department of orthopaedics, a total of 50 consecutive patients were taken in which (n=25) wounds were closed with sutures and (n=25) were closed with staples.

Inclusion Criteria

1)Adult patients(Age>18 years old)

2)All Open Orthopaedic procedures

3)Any wound>2 cm in length

Exclusion Criteria

1)Open fracture
2)Active infection
3)Foot surgery/Hand Surgery
4)Arthroscopic Procedures

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Baseline parameters including age,weight,height were collected. Medical Comorbidities affecting wound healing were identified. A smoking history was also obtained. After completion of the procedure, deep tissues were closed with an absorbable braided suture. In all patients the subcutaneous tissue was also closed with an absorbable braided suture. Patients allocated to the sutures intervention had their wounds closed using the suture material chosen by the primary surgeon. Those allocated to the staple group were closed using a commercially-viable stapler. Closure material was removed, when necessary, during a wound check two after surgery. Follow up of the patient was carried out at 2 and 6 weeks.

The primary outcome measure which was calculated was wound complication rate like infection, necrosis, abscess, dehiscence. The secondary outcome measure calculated was time to close the wound and postoperative VAS score.

Data Analysis was carried out with SPSS software and MS-Excel. A p-value of <0.05 was taken as a level of significance.

Results

Both the groups were comparable in terms of baseline variables

Table 1

Variables	Group	N	%	P-value
Female Sex	Stapler(n=25)	17	68%	
	Suture(n=25)	21	84%	0.33
Medical Co-morbidity	Stapler(n=25)	3	12%	
	Suture(n=25)	4	16%	1.0
Smoking	Stapler(n=25)	6	24%	
	Suture(n=25)	7	28%	1.0

Mean wound closure time was significantly less in staple group(3.44 vs 10.75 mins,p<0.01).

Table 2

Variables	Group	Mean	SD	P-value
Age	Stapler(n=25)	52.40	3.69	
	Suture(n-25)	52.34	3.58	0.95
BMI	Stapler(n=25)	27.80	1.96	
	Suture(n-25)	28.10	1.89	0.73
Mean length of incision	Stapler(n=25)	9.77	2.11	
	Suture(n-25)	10.12	1.94	0.19
Wound closure time	Stapler(n=25)	3.44	0.35	
	Suture(n-25)	10.75	1.21	<0.01

Mean pain score during suture removal was significantly more in staple group(VAS -3.71 vs 2.53;p<0.05).

Table 3

Pain Score	Group	Mean	SD	P-value
VAS	Suture	2.53	0.78	
	Staple	3.71	0.69	<0.01

Over wound complication rate in stapler and suture group was 40% and 16% respectively(p<0.12).

Table 4

Wound complication rate	Group	N	%	p-value
Suspected sepsis	Stapler(n=25)	8	32%	0.32
	Suture(n-25)	4	16%	
Proven Sepsis	Stapler(n=25)	2	8%	0.48
	Suture(n-25)	0	0%	
Malapproximation	Stapler(n=25)	5	20%	0.50
	Suture(n-25)	0	0%	
Wound Dehiscence	Stapler(n=25)	1	4%	1.0
	Suture(n-25)	0	0%	
Overall	Stapler(n=25)	10	40%	0.11
	Suture(n-25)	4	16%	

Discussion

Infection rate in present study was 4%(2/50 cases with proven sepsis).Previous studies comparing sutured and staples have demonstrated rate of infection ranging from 0.04% to 13% [5-9].Overall suspected infection rate in present study was 24%.Shanz et. Al observed a infection rate of 42% [13] while Ukay et al. Observed that rate of non infectious wound complications in clean orthopaedic and trauma surgery can be as high as 60% [14].Overall wound complication rate was 32% in a study by Khan et al [.6] and 50% in a study by Patel et al. [15]

In present study, mean wound closure time was significantly less in staple group(3.44 vs 10.75 min. p<0.01)

Shantz et al. also observed mean closure time as 12 min and 4.8 min in suture and stapler group respectively [13]

A recent Cochrane review concluded that there were insufficient data to recommend any technique or materials for wound closure but only conclusive outcome is that staples significantly reduce the time of skin closure [16].

Similar conclusions were also given by Pear et al in their review [17].

In present study, mean pain score during suture removal was significantly more in staple group(VAS -3.71 v/s 2.53;p<0.05)

In a similar study by Shantz et al. patients in the staple group(mean=3.69) reported more pain with removal than suture group(mean =2.5) [13].

Overall infection rate(32% v/s 16%) and wound complication was higher in stapler than suture group, but results didn't reach significant level.

Our findings are consistent with various recent studies in which staple closure was associated with significantly higher self reported wound morbidity compared with suture, a finding observed in both research studies and meta-analysis [18-20]

We also observed that in tensed skin, we can use tension releasing technique and in deep wound we can use mattress but with metallic stapler we cannot use any technique and it is difficult to close the wound in tensed skin

Footnotes

Financial disclosure-There is no financial disclosure.

References

1. Mangram AJ,Horan TC.Guide line for prevention of surgical site infection,1999.Hospital infection Control Practices Advisory committee.Infect Control Hosp Epidemol 1999;20:250-78;quiz 279-80
2. Li G,Guo F,Ou Y,Epidemiology and outcomes of surgical site infection fol-

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lowing orthopaedic surgery,Am J Infect Control 2013;41:1268-71
3. Owens CD,Stoessel K,Surgical Site Infection;Epidemiology,microbiology and prevention;J Hosp Infect 2008;70(Suppl 2);3-10
4. Smith TO,Sexton D,Sutures versus staples for skin closure in orthopaedic surgery:meta-analysis BMJ 2010;340;c1199
5. Singh B,Mowbray.Closur eof the hip wound,clips or subcuticular suture;does it make a difference?;J Orthop Traumatol 2006;16:124-9
6. Khan RJ,Fick D.A comparison of three methods of wound closure following arthroplasty;a prospective,randomised controlled trial,J Bone Joint Surgery Br 2006;88;238-42
7. Shetty AA,Kumar VS.Comparing wound complication rates following closure of the hip wounds with metallic skin staples or subcuticular vicryl suture;J Orthop Surg(Hong Kong) 2004;12:191-3
8. Livesey C,Wylde V.Skin closure after total hip replacement;a randomised control trial of skin adhesive versus surgical staples.J Bone Joint Surg Br 2009;91:725-9
9. Clayer M,Southwood RT.Comparative study of skin closure in hip surgery. Aust NZ J Surg 1991;61:363-5
10. Eldrup J,Wied U,Randomised Controlled trial proximate stapler with conventional closure.Acta Chir Scan 1981;147'501-2
11. Chugtai T,Chen LO,Clips vs suture technique;is there a difference?,Can J Cardiol 2000;16(1),232-34.
12. .Pandya NK,Edmonds EW,Immediate intramedullary flexible nailing of open pediatric tibial shaft fracture.J pediatric orthop 2012;32(8)770-6
13. Shantz JA,Vernon J,Sutures versus staples for wound closure in orthopaedic surgery;a pilot randomized controlled trial,Patient safety in surgery;2013 Feb 9;7(1);1
14. UcKay I,Agostinho A.NOninfectious wound complications in clean surgery;epidemiology,risk factors and association with antibiotic use. World J Surg,2011;35(5);973-80
15. Patel VP,Walsh M,Factors associated with prolonged wound drainage after primary total hip and knee arthroplasty.J Bone Joint Surgery Am.2007;89(1);33-8
16. Anderson ER,Gates S.Techinques and materials for closure of the abdominal wall in CS.Cochrane Database Syst Rev 2004,4:CD004663
17. Pearl ML,Rayburn WF:Choosing abdominal incision and closure techniques;a review;J Reprod Med 2004;49 662-70
18. Tuuli MG,Rampersad RM,Staples compared with subcuticular suture for skin closure after CS delivery;a systematic review and meta analysis.Obstet Gynecol 2011;117(3);682-90.Review.Erratum in;Obstet Gynecol.2011;1171440
19. Basha SL,Rochon ML,Randomised Controlled Trial of wound complication rates of subcuticular sutures vs staples for skin closure at CS.Am J Obstet Gynecol 2010;203;285.e1-8
20. Clay FS,Walsh CA,Walsh SR.Staples vs subcuticular sutures for skin closure at caesarean delivery;a metanalysis of randomised controlled trials. Am J Obstet Gynecol 2011;204:378-83.Epub 2010 Dec 31