ORIGINAL ARTICLE

DOES A SUBCUTICULAR NON-ABSORBABLE SKIN SUTURE GIVE BETTER OUTCOME THAN CLIPS IN ELECTIVE OPEN COLORECTAL SURGERY?

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ABSTRACT

Obective: To assess the patient satisfaction and wound outcomes in both techniques of wound closure

Material and Methods: A prospective cohort study including all the patients who underwent elective open colorectal surgery, in a single unit, from May 2015 to May 2017 at Mid Cheshire Hospital Trust Crewe, UK. Patients allocated to Subcuticular-suture or Skin-clips groups randomly depending on surgeons' choice. Data was collected on patient demographics, type of surgery, and methods of skin closure, rate of wound infection, cosmetic satisfaction and overall patient satisfactions.

Result: Three hundred and sixty nine patients were recruited and 218 patients completed the study, 134 patients were allocated to Skin Suture (SS) group with median age of 67 (IQR 61, 74). Skin Clips (SC) group had a total of 84 patients with a median age of 69 (IQR 61, 71). 15% of SS group developed wound infection, compared to 20 % in SC group ($p<0.05$). Over all 61% of SS group claimed excellent results compared to 46% in SC group ($p<0.05$).

Conclusion: Patients with non-absorbable subcuticular skin closure compared to skin-clips had low infection rates, better cosmetic and patient satisfaction outcome.

Key words: Skin, closure, wound, infection, skin clips , sub-cuticular.

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INTRODUCTION

Open Abdominal surgery (laparotomy) is the most commonly performed procedure in general (colorectal) surgery and midline scar is the hallmark of the procedure. Varieties of methods are used to close the skin. Traditionally skin sutures, absorbable or non-absorbable have been used to close the skin but more recently metallic skin-staples were introduced with aim to reduce closure time and infection rates.

The objective of good wound closure is effective skin healing with an acceptable cosmetic result to minimize complications such as wound dehiscence or infection. The method should be effective, efficient and comfortable for the patient[1]. Commonly used methods for skin closure in abdominal surgery are metallic clips and subcuticular non-absorbable sutures. Some studies have demonstrated that except for closure time, there was no significant difference in superficial infection and secondary outcomes comparing sutures to staples[2-4]. Surgical-site infections (SSIs) increase morbidity and mortality in surgical patients and represent an economic burden to healthcare systems[5-7]. Metallic clips are regarded as quicker and easier than sutures, but they are less acceptable cosmetically and are more expensive[5,8].

Majority of studies have been conducted in orthopaedics, obstetrics and gynecology, paediatrics and cardiothoracic surgery regarding methods of skin closure with clips versus sutures[8-10]. Some studies have shown no significant difference in complications between the two methods but the cosmetic results were poorer in patients where metallic clips were used[9]. Ranaboldo et al, in a study comparing the two methods,

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concluded that the analgesic requirement was less when laparotomy wounds were closed with sutures[10]. Pickford et al reported that skin closure in abdominal operations with clips reduces the incidence of wound infection, in patients in whom operative parietal contamination had occurred[11]. Subsequent trials have shown clips to be the preferred choice for abdominal wound closure in terms of time efficiency, but no significant benefit has been demonstrated in cost effectiveness.

A meta-analysis published in the BMJ in 2010 compared clinical outcomes of staples versus sutures in wound closure in orthopaedic surgery. The conclusion was that the use of metal clips and especially in hip surgery, is associated with a significantly greater risk of wound infection than traditional suturing[12-15]. We aim to assess the difference between clips and sutures in elective colorectal surgery in terms of wound infection and patient satisfaction.

MATERIAL AND METHODS

This is a prospective cohort study including all the patients who underwent elective open colorectal surgery in our surgical department from May 2015 to May 2017. An ethical approval for the study was taken from patient public department. Patients were allocated randomly into two groups by operating surgeons' choice depending upon the method of abdominal wound closure. Group 1 included the patient who had abdominal skin closure using non-absorbable skin-sutures (SS) and Group 2 included patients who had percutaneous staples for their skin closure (SC).

A quality of life questionnaire was designed on European and local guidelines and approval was taken from clinical governance department. A questionnaire was given to all the patients participating in the study, enquiring about scar, infection, pain and overall outcomes regarding cosmesis. Patients answered specific questions about infection (during their stay or after discharge from hospital), the use of antibiotics or the need for surgical management. Cosmetic results were assessed based on scar appearance, colour, thickness, width and numbness. Another aspect of the questionnaire was the management of any other scar problems in the community, for example GP or district nurses visits, pain management and the use of gel or ointments. Wound infection was defined if patient required antibiotics or stitch/clip removal before planned day. Patients who underwent elective open abdominal colorectal surgery and patients with virgin abdomen were included in the study while elective open abdominal surgery for non-colorectal disease, previous laparotomy incision, emergency open abdominal surgery for non-colorectal disease and patients who underwent emergency open abdominal colorectal surgery were excluded from the study. Robust questionnaire Proforma was used to assess the quality of life and patient satisfaction for abdominal skin closure after abdominal surgery.

Three hundred and sixty nine patients were identified as having elective open colorectal surgery. Data was collected on patient age, gender, type of procedure, BMI, comorbidities (ASA score), method of skin closure and patient questionnaire. All patients were seen at the outpatient clinic at six weeks and 3 months intervals for the first year after the surgery. The entire patient questionnaire was collected at the second clinic visit.

Statistical package for social science (SPSS) version 16.0 was used to perform Statistical analyses of the available data. Pearson chi-square test was used to analyze the data. Mean and median values were compared by standard statistical tests as appropriate. A p value of less than 0.05 was considered significant

RESULTS

Three hundred and sixty nine patients were identified as having elective colorectal surgery from May 2015 to May 2017. 151 patients did not meet the inclusion criteria. A total of 218 filled questionnaires were received. 134 patients were allocated to SS group with mean age of 67±9.3 (IQR 61, 74), median ASA 2 and body mass index (BMI) 28±6. SC group had a total of 84 patients with a median age of 69 (IQR 61, 71), Median ASA 2 and BMI 28.An overview of the demographic details of the participants is given below(Table 1).

Infection rates were divided in two categories: infection as in patient(IP) and overall infection rates. Only 7% of SS group patients developed infection while in-patients, as compared to 15% of SC group ($p<0.05$). But overall 15% of SS group developed wound infection, as compared to 20 % in SC group ($p<0.05$).

Appearance

Seventeen percent of SS group complained of scar thickness as compared to 28% in SC group ($p<0.05$), 30 % in SS group noticed widened scar and 45% in SC group ($p<0.01$). Only 38% of SS group could feel the scar as compared to 51% of SC group ($p<0.05$). 59% patients in SS group noticed that their scar matched the skin colour as compared to 45% of SC group ($p<0.05$). There was no significant difference noticed in prominence, swelling and tension of scar in both the groups. Outcome of different values is show Table 2. Which is then further divided into female & male population is show Table 3 & 4 respectively.

Seventy eight percent of patients in SS group were very satisfied with scar formation as compared to 55% of patients in SC group ($p<0.05$).

There was no significant difference noticed in pain and tension of scar in both the groups. The use of antibiotics, analgesics and ointments was also not significantly different. An equal percent of patients visited GP for scar problem.

DISCUSSION

Surgical site infection (SSI) is classified by the World Health Organisation (WHO) as; any purulent discharge, abscess, or spreading cellulitis at the surgical site during the month after the operation.

Table 1: An overview of demographic variables of the study groups.

Cohort	SS n=134 (61%)	SC n= 84 (39%)
American society of Aneasthesiologists grade	M=2 (1-4)	M=2 (1-4)
Left sided resections	n=103 (77%)	n=66 (78%)
Male	n=78 (58%)	n=50(59%)
Female	n=56 (42%)	n=34 (41%)

Table 2: Stratification of different outcome variables between SS and SC group by using chi square test(n=218).

Variables	SS		SC		p Value
	Yes	No	Yes	No	
Infection	15%	85%	20%	80%	p<0.05
Infection (IP)	7%	93%	15%	85%	P<0.05
Scar Thickness	17%	83%	28%	72%	P<0.05
Scar Width	30%	70%	45%	55%	p<0.05
Colour Satisfaction	59%	41%	45%	55%	P<0.05
Scar felt	38%	62%	51%	49%	P<0.05
Satisfaction	78%	22%	55%	45%	p<0.05

Table 3: Stratification of different outcome variables in female population between SS and SC group by using chi square test(n=90).

	SS		SC		p Value
Females	n=56		n=34		
	Yes	No	Yes	No	
Infection	19%	81%	18%	82%	p>0.05
Infection (IP)	9%	91%	15%	85%	P<0.05
Scar Thickness	11%	89%	25%	75%	p<0.05
Scar Width	13%	87%	38%	62%	p<0.05
Color Satisfaction	53%	47%	51%	49%	p>0.05
Scar felt	59%	41%	41%	59%	p>0.05

Table 4: Stratification of different outcome variables in male population between SS and SC group by using chi square test(n=128).

	SS		SC		p Value
Males	n=78		n=50		
	Yes	No	Yes	No	
Infection	11%	89%	22%	78%	p<0.05
Infection (IP)	9%	91%	13%	87%	p<0.05
Scar Thickness	16%	84%	33%	67%	p<0.05
Scar Width	13%	87%	38%	62%	p<0.05
Colour Satisfaction	92%	8%	80%	20%	p<0.05
Scar felt	36%	64%	47%	53%	p<0.05

Healthcare-Associated Infections (HAIs) is a subject of great concern of the healthcare services. Among the topographies of the HAIs, Surgical Site Infection (SSI) is directly related to surgical procedures, and is currently one of the most important among the HAIs[16-20]. SSI leads to serious consequences, including increased costs due to its treatment and increased length of hospital stay[21,22].

Our study suggests that metallic clips caused more wound infection and significant number of patients developed infection during hospital stay ($p<0.05$). Earlier studies suggested that a reduction in infection rates could be achieved with skin staples because staples do not penetrate the incision but cross the incision site and might cause less damage to the wound's defenses than non-absorbable sutures. However recent meta-analysis suggested the higher risk of wound infection with use of metallic clips in orthopaedic surgery than sutures and favors the use of sutures to close the wound[23,24].

Other clinical outcomes of SSIs include poor scars that are cosmetically not satisfactory, such as those that are widened, hypertrophic or keloid, persistent pain and itching, restriction of movement, and a significant impact on emotional wellbeing[25-27]. Our results showed that metallic clips increase the thickness ($p<0.05$), and width ($p<0.05$) of the scar as compared to non-absorbable sub-cuticle stitch. Similar results regarding thickness of the scar were reported by Clayer and Southwood in hip surgery[28]. A significantly higher number of patients in SC group claimed that the scar was palpable even after one year ($p<0.05$). Our results showed that patients in SS group noticed that their scar matches the skin colour after one year ($p<0.05$). Male patients in this study were more satisfied with the colour of scar than the female patients. The reason may be that females may have more aesthetic sense than males. We also noticed that there was no significant difference in prominence, swelling and tension of scar in both the groups. Similar results in orthopaedic cases showed that there was no significant difference in patient's satisfaction between SS and SC groups. However metallic clips are reported to be more painful than sutures[14,27]. Ranaboldo et al also showed increase pain and increase use of analgesics with metallic clips is associated with more distress and morbidity[20]. Our results illustrate that the subcuticular sutures are superior to metallic clips in terms of cosmesis of the wound and patient satisfaction. Some studies suggested that poor results from clips is attribute to the poor technique of clips placement and it leads to not only poor healing but also the wound discharge leading to wound infection. Also clips increase the rate of wound infection, which ultimately means increase number of dressings and nursing cost. None of the studies have looked into the cost related to wound infection and further management in terms of antibiotic use, GP visits and further surgical interventions.

Patients with sutures were generally more satisfied with scar formation ($p<0.05$). Lubowski et al showed no difference in complications between two techniques but there was convincing evidence that clips result in poor cosmetic results[19]. In our study male patients complained less than female patients about cosmesis and pain and were more satisfied with general outcome. Bragg et al support this after a patient satisfaction survey performed following abdominoplasty[29].

CONCLUSION

Patients with non-absorbable sub-cuticular skin closure compared to clips had reduced infection rates and were more satisfied with their scar and the cosmesis outcome..

Recommendations

We suggest using sub-cuticle sutures to close the skin in abdominal elective open colorectal surgery and recommend a randomized trail to be conducted in future, which includes newer techniques like skin-glue as well.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

Hussain A: Concept, Design, Data acquisition and Final approval.

Tahir AA: Data Acquisition, Drafting Manuscript, Bibliography.

Waheed R: Drafting, bibliography, proof reading.

Waraich N: Proof Reading.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.