

# Skin closure using staples and Nylon sutures: a comparison of results

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## Summary

A disposable skin stapler (Elite®: Auto Suture UK Ltd) and Nylon vertical mattress sutures have been used for skin closure. The complications related to each method were evaluated in 129 wounds. There was a higher incidence of inflammation, discomfort on removal and spreading of the healing scar associated with staples. The only advantage of staples was speed of wound closure.

## Introduction

The principal aims of tissue repair of surgical skin incisions are rapid acquisition of strength, minimum tissue damage with minimum inflammation and a good scar (1,2). Many factors, including the choice of suture material and its placement, influence these aims but of particular relevance is the accurate coaptation of the dermal margins; eversion or inversion leads to sub-optimal healing. The importance of primary skin healing in the avoidance of infection is paramount.

Although several workers (3,4,5) have compared the value of skin staples and conventional Nylon sutures, there are no reports in the literature of wounds being closed with both Nylon and staples in the same scar.

This study was designed to compare skin closure using staples and Nylon sutures in clean orthopaedic wounds, using both methods in the same wound; each wound affording its own control.

## Material and methods

Over a nine month period, patients undergoing elective or emergency hip and knee surgery, with incisions longer than 18 cm, were assessed. Only those wounds closed by the authors were included in an attempt to ensure a standard technique. One hundred and twenty-nine patients were randomly allocated to groups A or B. All wounds were divided into thirds and were closed by both staples and sutures in the following distribution:

Group A: odd birthyears – nylon/staples/nylon

Group B: even birthyears – staples/nylon/staples (Figs 1 and 2)

Division into thirds allowed a direct comparison between the two methods of closure in each wound, recognising that in any one wound the skin texture varies. At



FIG 1 Hip wound: nylon/staple/nylon segments.



FIG 2 Hip wound: staple/nylon/staple segments.

the junction of sutures and staples, however, a meaningful comparison was thereby available. Further, by randomising the distribution of the wound thirds, a more extensile appraisal of the scar segments could be made.

Anterior knee wounds require longitudinal mobility during the healing phase whereas lateral hip wounds are subjected mainly to angulation.

TABLE I Distribution of wounds in hip surgery

	Arthroplasty, Osteotomy	Internal fixation fracture neck of femur	Total
Nylon/staples/ Nylon n=43	39	4	43
Staples/Nylon/ staples n=56	44	12	56

TABLE II Distribution of wounds in knee injury

	Arthroplasty	Internal fixation supracondylar fracture, tibial plateau fracture
Nylon/staples/ Nylon n=20	14	6
Staples/Nylon/ staples n=10	6	4

The distribution of wounds is shown in Tables I and II. Wounds were closed with interrupted vertical mattress sutures using 3/0 (for knees) and 2/0 (for hips) Nylon (mono filament polyamide 6, Ethilon®, Ethicon). The skin stapler used in this study was the Elite® disposable model (Auto Suture UK Ltd). When stapling, the assistant elevates, minimally everts and then approximates the skin edges with two pairs of equal size toothed forceps, to try and prevent inversion of the skin edges. The operator then lightly places the stapler onto the skin and fires the staple.

All joint replacements were performed in a clean air enclosure, with the surgeons wearing body exhaust suits. Antibiotic prophylaxis was intravenous ampicillin and flucloxacillin given for a varying period perioperatively.

Skin closure was not timed in this series; previous workers (3,4,5) have all shown that stapling is much quicker than conventional suturing.

Wounds were inspected on the third, seventh and fourteenth postoperative days unless otherwise indicated. Final review was made in the out-patient clinic, nine months to one year postoperative.

Staples were removed with a Proximate® (Ethicon Ltd, Edinburgh) extractor while Nylon sutures were removed in the conventional way. Timing of removal varied from between ten and sixteen days and the presence of any pain during this procedure was recorded.

## Results

### HIP WOUNDS

In 48 (48.5%) wounds, healing was without any complication or discomfort and, at review, no difference could be seen between the segments (Fig. 3).

Staples were painful to remove in 21 (21.2%) wounds whereas in 6 (6.1%) instances it was found that Nylon sutures were more painful. Eight (8.1%) wounds developed abnormal erythema around the staples, but not the Nylon segments; in two of these, small areas of marginal necrosis developed and on removal of the staples the wounds healed satisfactorily. In one patient, the erythema was particularly severe and the possibility of metal sensitivity lead to subsequent cutaneous patch testing with the staples which proved negative. Erythema developed around Nylon sutures in two (2.0%)

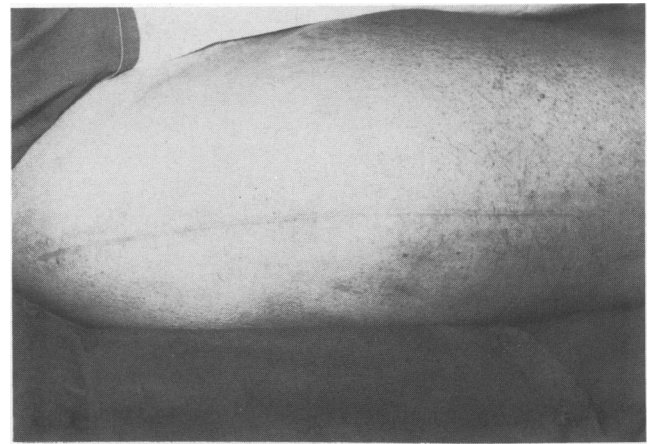


FIG 3 Hip wound 1 year following surgery. No difference can be seen between the staple and nylon suture segments.

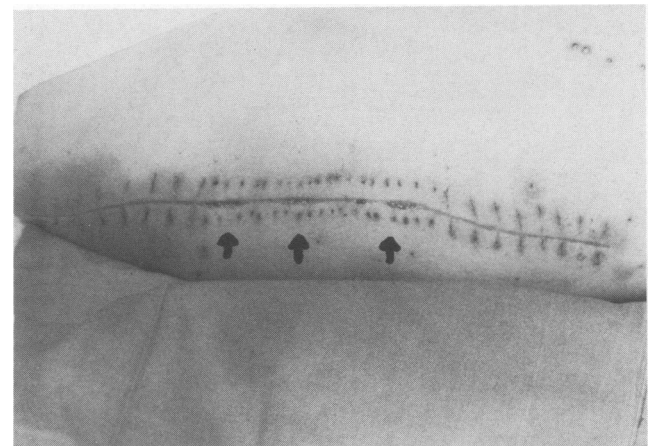


FIG 4 Hip wound showing spreading of the scar (arrows) after removal of staples following inversion of the skin edges, 16 days postoperative.

wounds, but not around the staples. In all patients who developed erythema, this settled following removal of either staple or suture and the wounds healed without any further problem. No difference being found between the segments at final review.

During placement of staples, great care was ensured to avoid inversion of the skin margins. It was observed on several occasions that, subsequently, it was easily possible to produce inversion after a satisfactory placement had been achieved. In fourteen (14.1%) wounds, inversion had occurred, that is after apparently satisfactory placement, and in all of these there was a variable tendency for the skin edges to gape when the staple was removed from these parts (Fig 4).

There were no superficial or deep wounds in the hip group.

### KNEE WOUNDS

Eighteen (60.0%) wounds healed without problem. In ten (33.3%) wounds, clips were painful to remove and in four of these, there was marked erythema which settled after removal. Only one patient claimed that the Nylon sutures were the more painful to remove.

One patient developed a superficial wound infection (*Staphylococcus aureus*/*Haemolytic streptococcus Group C*) related to a staple segment only, but this settled after six days of oral antibiotic therapy and, after nine months, there have been no sequelae.

Overall, 66 (51.2%) wounds healed without problem. Staples tended to be more painful to remove than sutures (24.0% v 5.4%) and erythema was more common

around them (7.8% v 2.3%), particularly in knee wounds (13.3% v 6.1%).

Ease of use of the stapler was operator dependant and this improved with experience.

### Discussion

This limited study has revealed a higher complication rate in wounds closed by staples, compared with those closed by Nylon vertical mattress sutures. Uncomplicated wounds from both types of closure have exhibited similar cosmetic appearances. Staples were invariably more painful to remove.

Both suturing and stapling are technical acts requiring care and both have to be learned; we attempted to employ both methods with appropriate accuracy. Different stapling models could have been evaluated, but we doubt any other conclusion. It appears that the only advantage of stapling is its speed of execution and it is

difficult to balance this with the higher cost and increased complication rate. This is stated with some regret because, undoubtedly, at the end of a lengthy procedure, it is so pleasurable to use a skin stapler.

### References

- 1 Bryant WM. Wound healing. *Clinical Symposia* 1977;29: 2-26.
- 2 Dunphy JR. Wound healing. New York Medcom Inc;1974.
- 3 Eldrup J, Wied U, Anderson B. Randomised trial comparing proximate stapler with conventional skin closure. *Acta Chir Scand* 1981;147:501-2.
- 4 Gatt D, Quick CRE, Owen-Smith MS. Staples for wound closure: a controlled trial. *Ann R Coll Surg Eng* 1982;67:318-20.
- 5 Steele RJC, Chetty U, Forrest APM. Staples or sutures for mastectomy wounds?: a randomised trial. *J R Col Surg Edinb* 1983;28:17-8.

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## Notes on books

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**Replacement of Renal Function by Dialysis** edited by William Drukker, Frank M Parsons and John F Maher. 945 pages, illustrated, paperback. Martinus Nijhoff, Dordrecht. £59.75.

This is a large and detailed reference book covering every possible aspect of the subject of dialysis. The aim of the editors has been to present a full bibliography a readable form and present current views as held by recognised world authorities. Theoretical aspects such as membrane chemistry and design and function of dialysers have also been included. The social and economic aspects have been covered in depth. Each chapter ends with a series of references often running into several hundred in number. In short, an essential volume for all departments of renal medicine and surgery.

**A Colour Atlas of Minor Surgery** by William F Walker. 200 pages, illustrated. Wolfe Medical. £60.

The editor defines minor surgery as being those operations which are performed principally by surgeons in training. Some 80 or more procedures are illustrated including plastic surgical procedures, orthopaedic procedures and some gynaecology. The text is succinct and for the most part the colour illustrations are of good quality. It is pleasing to note that in the introduction the importance of accurate anatomical knowledge is stressed in bold type. This precept is as true for so-called minorsurgery as for the most complex procedure.

**A Colour Atlas of Cleft Lip Surgery** by R J Mancksha. 63 pages, illustrated. Wolfe Medical, London. £14.

The author is a plastic surgeon who has had extensive experience of cleft lip surgery over three decades. He describes and illustrates the Millard repair performed in an adult patient. A number of before and after photographs of operations performed in children are also included.

**HLA Class II Antigens. A Comprehensive Review of Structure and Function** edited by B G Solheim, E Møller and S Ferronc. 563 pages, illustrated. Springer-Verlag, Berlin. DM 226.

Transplant surgeons will be the principal readers of this notice who will find this volume of interest. Nearly a hundred leading scientific workers contribute to an extensive view of histocompatibility antigens. Molecular biology, basic and clinical immunology and transplantation aspects are all summarised, differing views presented and discussed and clinical relevance given important coverage.

**Tissue Nutrition and Viability** edited by Alan R Hargens. 312 pages, illustrated. Springer-Verlag, New York. DM 198.

Recent research suggests that periodic moderate stress is important in the maintenance of normal structure and function of different tissues. This book addresses the topic of tissue nutrition and growth with especial reference to the possible benefits of stress. Tissues that are discussed include bone, cartilage, lung, nerve, muscle, skin and subcutaneous tissues.

**Peritoneal Dialysis** edited by Karl D Nolph. 2nd edition. 713 pages, illustrated. Martinus Nijhoff, Dordrecht. £69.95.

An extensive reference text on peritoneal dialysis. Every chapter has been thoroughly updated for this new edition and new chapters have been added on ultrastructure, complications, applications in children, diabetics, rehabilitation and social aspects. Essential reading for all those who deal with patients in chronic renal failure.