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Short note

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Wound infection after abdominal incision with scalpel or diathermy

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There is no controlled clinical study of wound healing after different techniques of abdominal incision. The scalpel produces a clean, incised wound with minimal tissue destruction. Diathermy produces a burn of variable depth in the tissue, but may reduce bleeding and make the incision quicker.

A study in the rat¹ confirmed that diathermy results in slower healing of the skin than scalpel incision, but there was no difference in wound bursting strengths. There was more infection after diathermy incision than after scalpel incision².

In this study, we randomized patients to have the abdominal incision made by knife or diathermy, and we prospectively recorded the time required to make the incision and the wound infection rate.

Patients and methods

A total of 240 consecutive patients were randomly allocated to have the abdominal incision made either with a surgical scalpel or with cutting diathermy. Midline incisions were made using the allocated technique through all layers. Muscle cutting incisions were made using the allocated technique for the subcutaneous fat and deep fascia only; the muscle was cut using diathermy.

Patients undergoing reoperation within 1 month of laparotomy and patients with ruptured abdominal aortic aneurysm were excluded.

Wounds were classified according to the site and direction of the

wound, the presence of a previous incision and the degree of operative contamination³. The length of the wound and depth of subcutaneous fat were recorded. The time was recorded from the start of the skin incision to completion of the peritoneal incision with complete haemostasis. A uniform policy of prophylactic antibiotic cover was used and established infection was treated as appropriate. Peritoneal lavage was performed with chlorhexidine in normal saline in cases with peritoneal contamination or infection. All incisions were closed using a mass suture technique: Subcutaneous sutures and subcutaneous drains were not used.

Wounds were inspected daily. Any sign of sepsis was recorded. Wound infection was defined as the discharge of pus or fluid containing pathogenic organisms⁴. We also recorded inflammation (redness) of the wound, stitch abscess, and discharge of culture negative fluid. These categories together with infected wounds were called inflamed wounds.

Differences between the two groups were compared using the χ^2 test.

Results

The two groups had similar preoperative and operative characteristics (Table 1). The length of the incision and depth of subcutaneous fat were similar. There was no difference in the time taken to create the wound in each group (Table 1).

There were 28 (11.6 per cent) inflamed wounds, of which 16 (6.7 per cent) were infected. Inflammation and infection were equally frequent in the two groups, independently of wound classification (Table 2).

Table 1 Characteristics of patients and wounds studied

	Scalpel	Diathermy
Number	130	110
Age (range)	68 (18-95)	72 (26-92)
Male:female ratio	60:70	43:67
Elective:emergency ratio	79:51	70:40
Incision		
Midline	86	67
Paramedian	15	9
Transverse	29	34
Length* (cm)	20 (16-33)	19 (15-22)
Depth* (cm)	2 (1.5-3)	2 (1.5-3)
Time* (min)	3.5 (2.8-4.5)	3.3 (2.5-4)

* Values are median (interquartile range)

Table 2 Inflammation and wound infection by type of wound

	Scalpel					
	Total	Inflamed	Wound infection	Total	Inflamed	Wound infection
Clean	23	2 (9)	1 (4)	27	1 (4)	
Clean-contaminated	55	2 (4)	1 (2)	50	3 (6)	1 (2)
Contaminated	26	3 (12)	3 (12)	20	5 (25)	2 (10)
Severely contaminated ('infected')	26	8 (31)	6 (23)	13	4 (31)	2 (15)
Total	130	15 (11.5)	11 (8.5)	110	13 (11.8)	5 (4.5)

Values in parentheses are percentages

Two patients in the 'scalpel' group developed complete wound dehiscence. Both wounds were severely contaminated and developed wound abscesses prior to dehiscence.

Thirty-five incisions were made through a well healed previous laparotomy scar. Of these wounds 21 were made using a scalpel and 14 with the diathermy. There was no difference between these groups in time taken for incision or wound infection rate. There were two cases of accidental enterotomy, one in each group. The enterotomy was closed immediately and neither patient developed a wound infection or other complication.

Discussion

We have shown that the method of incision of a laparotomy wound has no effect on subsequent wound infection rates. There was no difference in the time required to make the incision and to achieve complete haemostasis. The more rapid haemostasis with diathermy appears to be counterbalanced by the more rapid incision of tissue with the knife.

Diathermy causes tissue necrosis in addition to division of the tissue⁵, and this might favour infection or an inflammatory reaction around the wound^{6,7}. The incidence of wound infection and of inflamed wounds was, however, similar in the two groups.

There were two burst abdomens but no significance can be attached to the fact that both incisions were made with a scalpel since in both overwhelming infection and chronic respiratory disease contributed to the dehiscence.

The 35 patients in whom the incision was made through a previously healed scar had similar characteristics to the overall series. Only one wound became inflamed.

It has been suggested that incisions made with diathermy might be less painful than those made with a scalpel⁸. If this is confirmed by others then there would be a positive reason for choosing the diathermy rather than a scalpel for incision of the abdominal wall. Until then each surgeon may follow his own personal preference.

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