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Postoperative neuralgia in the leg after saphenous vein coronary artery bypass graft: a prospective study

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ABSTRACT The degree of cutaneous sensory deficit in the leg was assessed after removal of the long saphenous vein in 50 consecutive patients undergoing coronary artery bypass vein grafts randomly assigned subcutanous sutures or a single layer of sutures. Removal of the vein and repair of the leg incision were done by the same team of surgeons. In group 1 (25 patients) the leg incision was repaired with "00" Dexon subcutaneous and "00" prolene subcuticular sutures while in group 2 (25 patients) closure was effected by a single layer of interrupted "00" nylon sutures. All had crepe pressure bandage from the base of the toes to the groin for the first 24 hours followed by TED stockings for six to eight weeks. Sutures were removed on the eighth postoperative day. Cutaneous sensation in the leg and ankle was assessed 48 hours, seven days, and six to eight weeks after surgery, and a final comparison of the cosmetic effects and sensory perception after one year or more was made in 37 patients. There were no major differences between the groups at 48 hours in sensory abnormalities (anaesthesia, hyperaesthesia, and pain) but sensory recovery was significantly better in group 2 at the second and third assessments. There was some reduction in sensory abnormalities at the final review in group 1. No appreciable difference was noted in the quality of the scar between the two groups. We conclude that cutaneous sensation is better preserved by repairing the leg incision in a single layer. Subcutaneous sutures may produce neuropraxia of the long saphenous nerve by direct pressure as healing progresses.

The long saphenous vein is still the most popular graft material for coronary artery bypass surgery despite the use of synthetic conduits[1] and the recent increase in the use of the internal mammary artery. After surgery some patients experience sensory deficits around the ankle and leg, such as pain, anaesthesia, and hyperaesthesia. These are due to various degrees of injury to the long saphenous nerve, which lies in close proximity to the vein below the knee. We noticed that sensory abnormalities occurred even when meticulous care had been exercised to avoid nerve damage at operation. We have analysed the effects of wound repair techniques on the incidence of cutaneous sensory deficits, on the basis of a prospective randomised study of two groups of patients in whom the leg incision was repaired in different ways.

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Methods

Fifty three consecutive patients (aged 33–71 years) undergoing saphenous vein coronary artery bypass graft operations at Wythenshawe Hospital from September 1985 to January 1986 were randomised into two groups, after exclusion of those with diabetes mellitus, varicose veins, and peripheral arteriopathy. Vein removal and wound closure were done by the same surgeons in all cases. The incision was started just above the ankle and extended upwards with minimal dissection, ensuring complete preservation of the long saphenous nerve and its branches. Three patients were excluded from the study at this stage because of trauma to one of the nerve branches. Meticulous care was taken to avoid nerve fibres during closure of the incision. In group 1 (21 men and four women) the repair was effected by "00" Dexon subcutaneous and "00" prolene subcuticular layers. In group 2 (22 men and three women) the incision was closed by a single layer of "00" interrupted ethilone sutures that included the skin and the very superficial

part of the subcutaneous tissue only. No drains were used in either group. All had crepe bandage support from the base of the toes to the groin for the first 24 hours and TED stockings for six to eight weeks thereafter. All patients had intravenous antibiotics for 48 hours (netilmicin with flucloxacillin or erythromycin) and a combination of 300 mg aspirin and 225 mg persantin daily as antiplatelet treatment. Sutures were removed on the eighth postoperative day.

Sensory perception around the leg incision was assessed 48 hours, seven days, and six to eight weeks after surgery in all patients, soft cotton wool being used for tactile sensation and hyperaesthesia and a pointed needle for exaggerated pain sensitivity. There was no wound infection or haematoma formation in this series. Sensory abnormalities and cosmetic results were checked in 37 patients (16 from group 1 and 21 from group 2) 14–18 months after surgery with the assistance of a ward sister, who had no knowledge of the wound closure technique used. Sensory perception was tested as before by one of the authors and the cosmetic result of the scar graded as excellent, good, or average by the ward sister. Five patients were dead and eight not available for follow up.

The incidence of sensory abnormalities in the two groups was compared by the χ^2 test for 2 × 2 contingency tables.

Results

There was a high incidence of numbness 48 hours after surgery in both groups of patients (table 1). This had decreased by 7 days, but the recovery rate was considerably better in the patients who had received a single layer of sutures (group 2) ($p < 0.002$). There was an increase in pain and hyperaesthesia in group 1 but a decrease in group 2 ($p < 0.02$). Again, six to eight weeks after the operation there was a significant advantage for group 2 ($p < 0.02$) in the recovery of sensory perception.

Examination 14–18 months after surgery showed a higher incidence of sensory abnormality in group 1 (table 2). The scar quality was very good in both groups, with no appreciable difference between them.

Table 2 *Quality of scar and sensory abnormalities in 37 patients 14–18 months after surgery (numbers (%) of patients)*

Group:*	*1 (n = 16)*	*2 (n = 21)*
Sensory deficit		
Anaesthesia	3 (19)	1 (5)
Hyperaesthesia	4 (25)	1 (5)
Pain	3 (19)	0
Quality of scar		
Excellent	13 (81)	15 (71)
Good	3 (19)	5 (24)
Average	0	1 (5)

*See footnote to table 1.

Discussion

Different techniques for wound repair have been described and their cosmetic, healing, and economic characteristics compared.[2–4] Neuralgia and numbness of the ankle and leg are common symptoms in patients who have had coronary artery bypass surgery with the long saphenous vein, and yet few studies have investigated the possibility of prevention. This is an important aspect of present day coronary artery surgery as the long saphenous vein is still the most widely used graft material, despite increasing use of the internal mammary artery as a graft.

The saphenous nerve becomes superficial in the leg and may give an articular branch to the medial side of the knee joint.[5] It then descends with the long saphenous vein towards the medial malleolus. We have noticed at least three branches of this nerve passing laterally in the leg segment. Injury to the saphenous nerve and its branches results in most of the postoperative sensory abnormalities in the leg. Nerve injury may occur at operation as a result of surgical handling or trauma or postoperatively from compression. Since meticulous preservation of nerves was ensured in all our cases, the major variable affecting the final outcome in these patients was the method of surgical repair. We did not use Redivac drains in the leg in these patients as they can cause nerve compression. Most surgeons choose to close the leg incision with a subcutaneous layer of sutures and a further

Table 1 *Numbers (%) of patients with sensory abnormalities in the two groups* at different times after surgery*

Time after surgery:	*48 hours*		*7 days*		*6–8 weeks*	
Group:*	*1*	*2*	*1*	*2*	*1*	*2*
Anaesthesia	23 (92)	22 (88)	18 (72)	6 (24)***	11 (44)	2 (8)**
Hyperaesthesia	2 (8)	1 (4)	9 (36)	1 (4)**	3 (12)	1 (4)
Pain	4 (16)	2 (8)	8 (32)	0**	9 (36)	0***

*Group 1—25 patients receiving Dexon subcutaneous and prolene subcuticular sutures; group 2—25 patients receiving a single layer of interrupted nylon sutures.
**$p < 0.02$.
***$p < 0.005$.

means of skin approximation. Tissue approximation and haemostasis are the major objectives of a subcutaneous layer, but we observed that these could be achieved satisfactorily in the leg with interrupted suture approximation of the skin and a firm pressure bandage. There was no haemorrhage or wound haematoma in our series. The routine use of TED stockings as a postoperative support was subjectively comforting and reduced tissue oedema.

There was a high incidence of numbness around the incision in both groups in the first 48 hours (table 1). This was due to a combination of surgical trauma and tissue inflammation as wound healing began. Subsequent examinations seven days and six to eight weeks after operation, however, showed a consistently higher rate of sensory recovery in group 2 patients, in whom no subcutaneous sutures had been used. Interestingly, more group 1 patients had pain and to a lesser extent hyperaesthesia at these subsequent assessments than at the first. We believe that this relates to an established neuropraxia of the saphenous nerve trunk and its branches in the subcutaneous tissue. Neuropraxia results from the pressure on the nerve by subcutaneous sutures as they cross the wound several times along its entire length. As tissues develop changes of inflammation due to wound healing, these sutures are tightened and may exert pressure on the adjacent nerve fibres where the suture crosses the nerve. This effect may continue until the inflammation subsides or the sutures themselves are absorbed. There is no doubt that the pressure bandage also compresses the saphenous nerve in the leg segment, but this effect is transient as the bandages are removed after the first 24 hours. The corresponding sensory features in group 2 showed remarkably better results with no cases of pain and only one of hyperaesthesia.

The final review 14–18 months after surgery was done with the help of an independent observer, who compared the scar quality. An absolute comparison of sensory abnormalities in the two groups was not possible because of the death of five patients and the non-availability of eight others. We noticed, however, that despite some further recovery there was still a higher incidence of sensory abnormality in group 1. There was no appreciable difference in the cosmetic effects of the scar in the two groups, and cross striations due to the interrupted scar had become inconspicuous with time. We attribute this to adequate tissue approximation and early removal of sutures.

We conclude from our observations that subcutaneous sutures may be one source of nerve compression in the leg, and that single layer wound closure after removal of the long saphenous vein reduced the incidence of sensory abnormalities around the scar.

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