PLASTIC SURGERY

Does Topical Application of Bupivacaine (marcaine) to Skin Graft Donor Site Have Any Effect on Moriarty Sign?

O. M. Oluwatosin, F. O. Abikoye, S. A. Ademola, A.A. Sanusi and O. A. Soyannwo

Plastic Surgery Unit, Department of Surgery, University College Hospital, Ibadan, Nigeria

ABSTRACT

Moriarty sign designates that when split skin donor site is more painful than recipient site, good graft take is likely. This prospective study was designed for the dual purpose of confirming the validity of Moriarty sign and to determine if bupivacaine topical anaesthetic application to split skin donor site will influence the sign. The difference in response to pain indicated by the Moriarty sign between patients that had topical analgesic treatment and those that did not was statistically significant from day one to day five post operatively. Routine application of long acting topical analgesic to donor site is advocated *(Nig J Surg Res 2000; 2:131-134)*

KEY WORDS: Bupivacaine, local anaesthetic, skin graft, pre-emptive analgesia.

Introduction

The finding that split skin donor sites are painful and more so than the recipient site[1] has in the past prompted the trial of topical agents with the aim of relieving the discomfort that follows skin grafting. Owen and Dye [2] for example obtained statistically significant improvement in pain relief without affecting wound healing in a randomly controlled prospective trial using 2% lignocaine gel. Negative Moriarty sign denotes that the recipient site of partial thickness skin graft is more painful than the donor site. [3] This situation is the reverse of what normally obtains, which is that the donor site is more painful than the area grafted. The Moriarty sign designates that when split skin donor site is more painful than recipient site, good graft take is likely. [4]

This study was conducted for the purpose of confirming the validity of Moriarty sign, and also to determine if bupivacaine topical anaesthetic application will influence the sign.

Patients and Method

Fifty three cases of partial thickness skin grafting of a mixed group of age, sex, and ethnicity, were studied prospectively at the Department of Surgery, University College Hospital, Ibadan, over a period of 21 months from January 1997. They were entered consecutively; Group I consisted of the first 26 patients who had grafts harvested from them without post operative bupivacaine pain control while the last 27 patients who had their donor sites treated with bupivacaine made up group II. Randomization into each group was not carried out because the initial purpose of the study was to confirm the validity of Moriarty sign only. These patients underwent split skin grafting for several indications using modified Humby's graft knife. All grafts were fenestrated and

Reprint requests to: Dr. O. M. Oluwatosin, Department of Surgery, University College Hospital, Ibadan, Nigeria.

conventional dressings were applied to both donor and recipient sites. In group I these consisted of a layer of meshed gauze, covered by gauze, gamgee and crepe bandage. In group II where patients had topical application, Gauze soaked in of 0.5% plain bupivacaine solution was spread temporarily over the donor site for 10 minutes before the conventional dressings were applied. Pentazocine, 30 mg., intramuscularly, 8 hourly was given post operatively. The dressing was left undisturbed for 5 days over the recipient site and two weeks over the donor site. Moriarty sign was recorded daily for five days as follows: negative when recipient site was more painful than donor site, and positive when donor site was more painful than the recipient site. On the fifth day post operation, skin graft take was noted.

Results were analysed using Fisher's test. This tested the validity of Moriarty sign, compared the Moriarty sign obtained in the group without treatment to that obtained in the group that had treatment with bupivacaine. The level of significance was taken as $p < 0.05$

Results

Patients' age range was 9 to 63 years. The commonest indication for skin grafting was the burn wound 16 (30%). Other indications were other forms of trauma 12 (23%), complications of wound healing (scars, contractures) 12 (23%), chronic ulcers 6 (12%) and excised malignancy 6(12%). The mean (S.D) surface grafted expressed as percent of total body surface was 4.4 (3.1) in the group that did not have donor site topical treatment with bupivacaine, and 3.1 (2.7) in the group that had topical treatment.

Graft take on 5th postoperative day was >95% in most cases(37, 69%), 81% - 95% in others (14, 27%) and <81% in 2 (4%). The least graft take was 70%. Reasons for less than 100% take were seromas, haematomas, infection, and movement of dressings, which caused displacement of graft on the recipient bed.

Table 1:Percentage Graft Take on 5th Postoperative Day With Moriaty Status in Cases Without Topical Donor Site Treatment

%Take	Moriarty + ve	Moriarty- ve
96-100	22	0
<95	2	2
P=0.019		

Table 2:Comparision of Response of Patients Who Had Donor Site Treatment With Those Who Did Not, Using Fisher's Exact Test

Post operative day	P value
1st day	< 0.00001*
2nd day	<0.00001 *
3rd day	< 0.0005 *
4th day	< 0.0005 *
5th day	< 0.0013 *

*Significant results

In the group that did not have donor site topical treatment (Table 1), 24 cases were Moriarty positive on at least three out of five days. Of these, 22 grafts took more than 95%. None of the remaining two cases that were Moriarty negative on at least three out of five days had a graft take greater than 95%. Employing Fisher's exact test, this is a significant result ($p = 0.019$).

Table 2 shows that the difference in response, indicated by the Moriarty sign, between those that had topical analgesic treatment of their donor site and those that did not, was statistically significant from day one to five post operatively. The level of significance decreased with increasing number of days after operation.

Discussion

Moriarty negative sign, that is, greater pain experienced at recipient than at donor site, has

been demonstrated previously to suggest that the graft is unlikely to take 100%. [3] The validity of this statement is confirmed in the present report. The reason for an incomplete graft take may be found in an infection, which produces the pain of an inflammatory process thereby rendering the recipient site more painful than the donor site. Other causes of graft failure like haematomas and seromas may for the same reason produce significant pain at the graft bed to overshadow the pain at the donor site.

The statistically significant difference in response to pain between those that had topical analgesic and those that did not is an indication of the usefulness of topical analgesics in the treatment of skin graft donor sites. Many local anaesthetics have been marketed since Koller first introduced the use of local anaesthetics into medicine in 1884. [5] Since then advance including addition of adrenaline for reduced systemic toxicity and the synthesis of amides such as lignocaine, and longer acting bupivacaine, for improved anaesthetic efficacy and reduced allergenicity have taken place. Similar progress in administration techniques such as that found in the use of gels [2,6] for enhanced and prolonged local action now make it possible for such local anaesthetics to be used on skin surface.

Bupivacaine provides better postoperative pain relief by acting longer than most local anaesthetic agents after a single application. It is a highly lipid soluble local anaesthetic [7] although the onset of action is slower compared to lignocaine. One main advantage of bupivacaine is its ability to produce differential neuronal blockade resulting in more sensory than motor blockade particularly at low concentrations. The low dosage of 25-50 milligrams used in this study in each case constantly produced enough pain relief to cause Moriarty negative response, this not withstanding the skin donor surface extent. Systemic toxicity is most unlikely when used at this low dosage. [6] Bupivacaine has a potent protein-binding characteristic. Ninety percent of a given dose binds to protein. [7] This protein-binding characteristic determines the duration of action of a local anaesthetic. Thus bupivacaine which binds to plasma protein to a greater degree than lignocaine has a longer action by a factor of two to three. [9] A few pain free hours of recovery from skin grafting is invaluable. This can be achieved more with bupivacaine than by lignocaine.

Interestingly, bupivacaine application significantly altered the Moriarty sign rendering a relatively pain free donor site for all of the five days after grafting that were considered in this study. This duration is in excess of the three to four hours recorded in literature [10] and up to 12 hours for some nerve blocks. [11] Even when bupivacaine was used as part of a balanced pre-emptive analgesic technique, [12] the duration of action was far less than the 5 days in this study. This atypical duration requires further investigation.

References

1. Converse TM, Robb-Smith AHT Healing of surface coetaneous wounds; its analogy with healing of superficial burns. Ann Surg 1944; 120:873
2. Owen TD, Dye D. The value of topical lignocaine gel in pain relief on skin graft donor sites. Br J Plast Surg 1990; 43:480-482
3. Birchall MA, Virma S, Milward TM. The Moriarty sign: an appraisal. Br J Plast Surg 1991; 44: 149-150
4. Freshwater M.F. Ten signs for successful skin grafting. Plast Reconstr Surg 1983; 72:419-420
5. Yagiela JA. Local anaesthetics: a century of progress. Anaesth 1985; 32: 47-56.
6. Alvi R, Jones S, Burrows D et al. The safety of topical anaesthetic and analgesic agents in a gel when used to provide relief at split skin donor sites. Burns 1998; 24: 54-57
7. Kelton PL Local anaesthetics, Cocaine, and CPR. Select Read Plast Surg 1992; 7:1-27.
8. Calvey TN, Williams NE. Local anaesthetic agents. In: Principles and

practice of pharmacology for Anaesthetists. 2nd edition, Blackwell Science, 1996; 228-259.

9. Covino BG. Pharmacology of local anasthetic agents. Rational Drugs Therapy 1987; 21:1-8
10. Haberer J, Dalens BJ. Local anaesthetics and additives. In: Dalens BJ (ed) Paediatric regional anaesthesia. CRC Press, Florida, 1990: 91-126.
11. Yentis SM, Hirsal NP, Smith GB (ed Anaesthesia: A to Z (an Encyclopaedia Principles and Practic Butterworth/Heinemann 1997: 64.
12. Campbell WI, Kendrick RW, Fee JP Balanced pre-emptive analgesia: does work? A double blind, controlled study bilaterally symmetrical oral Surgery. Br Anaesth 1998, 81: 727-730.