Nerve supply of the nipple: only from the fourth or from several intercostal nerves?

A clinical experiment and an anatomical investigation

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Abstract. The hypothesis that the lateral cutaneous branch from the fourth intercostal nerve is the only nerve supplying the nipple was tested in a clinical experiment and anatomical dissections. Local anaesthetic block was applied to the lateral cutaneous branch of the fourth nerve during augmentation mammaplasty. The anaesthetic failed to produce numbness of the nipple, suggesting that more than one nerve is involved. Anatomical dissections in female cadaver breasts revealed that in all cases there are nerve branches other than those from the fourth intercostal nerve which give additional nerve supply to the nipple.

Key words: Nipple, nerve supply

The nerve supply to the trunk comes segmentally from the ventral primary rami of the intercostal nerves and in text book diagrams the nipple is often placed in the territory of the fourth nerve [19]. Edwards [6] emphasized the importance of the anterior branch of the fourth lateral cutaneous nerve which 'constitutes a unique nerve' to the nipple. Farina and co-workers [7] consider it to be its only nerve supply. This nerve to the nipple can be visualized during augmentation mammaplasty through a sub-mammary incision [3, 13]. There is ample clinical evidence that the nipple receives innervation by a nerve branch passing through the inferolateral part of the breast as it retains sensation in most of cases of breast reductions using inferior pedicle [8, 9].

A clinical experiment was used to test the hypothesis that the branch from the lateral cutaneous branch of the fourth intercostal nerve is the only supply to the nipple. Further anatomical investigations using magnification, and modern techniques of dissection were used to establish if branches from other intercostal nerves which supply the breast contribute to the innervation of the nipple.

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Fig. 1. Mammary branch from the fourth lateral cutaneous nerve. Through the inframammary incision the nerve is demonstrated; it is held up by a loop. The nerve is emerging through the retromammary space

Fig. 2. Mammary branch from the lateral cutaneous branch of the fourth nerve seen against a blue background. The nerve can be mobilized to accommodate the implant
Material and methods

In fifteen patients the branch from the anterior division of the fourth lateral cutaneous nerve was identified during augmentation mammoplasty through an inframammary incision. The nerve was isolated in the inferolateral part of the breast and skeletonised, (Fig. 1). Five ml 0.5% Bupivacaine with adrenaline 1:200000 was infiltrated around the nerve in the area where the nerve emerged through the serratus anterior. The breast implant was inserted in the subglandular pocket and the wound closed (Fig. 2). When the patient was fully awake in the recovery room, nipple sensation was tested using cotton wool and a needle prick. If the nipple was numb the test was repeated next morning to find out of the numbness was due to the anaesthetic block or some other reason.

The nerves supplying the nipple were investigated using magnification in anatomical dissections of female cadaver breast specimens. Details in origin, course and distribution of the nerves supplying the breast have been presented elsewhere [14].

Results

The anterior branch of the lateral cutaneous branch of the fourth intercostal nerve was infiltrated with local anaesthetic in both breasts in 15 patients. Twenty-four of these thirty breasts showed no numbness of the nipple during the post operative period. Six breasts in four patients had anaesthesia of the nipple to light touch and needle prick. In these six breasts the nipple remained insensate even on next morning. An area of numbness of skin to finger touch in the inferolateral part of the breast confirming effective local anaesthetic was noted in all cases.

Our cadaver breast dissections showed that branches from intercostal nerves other than those from the fourth nerve supply the nipple. A nerve fascicle from the anterior cutaneous branch from the third intercostal nerve is seen reaching the nipple (Fig. 3). In one specimen several mammary branches approached areola from different directions (Fig. 4). Communications were seen between the adjacent mammary nerves and also between branches coming from the lateral and anterior cutaneous nerves (Fig. 5).

Fig. 3. Nerve fascicles from the anterior cutaneous branch of the 3rd intercostal nerve supplying the nipple. The nerve (arrows) is lying on a background marker

Fig. 4. Branches coming from the lateral cutaneous and the anterior cutaneous branches of the numbered intercostal nerves converging on the areola

Fig. 5. Communications between the mammary branches (arrows). Connections between the branches from the 4th and 5th lateral cutaneous nerves 'A' and those between the branches of lateral and anterior cutaneous nerves 'B'. A conical portion 'P' from the inferolateral part of the breast removed to show the nerves. S, superior, L, lateral