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AN INFILTRATION TECHNIQUE FOR REDUCTION MAMMAPLASTY: RESULTS IN 192 CONSECUTIVE BREASTS

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SUMMARY

The use of local anaesthetic infiltration with adrenaline is now considered safe in reduction mammoplasty. However, the technique of infiltration by those who support its use is often unclear. Any technique must take account of the neurovascular anatomy of the breast if it is to be effective. We propose the use of a large volume of dilute local anaesthetic (20 ml of 1% lignocaine and 1 mg of adrenaline made up to 400 ml with 0.9% saline) which is placed judiciously in the retroglandular space 15 minutes prior to surgery.

The results in 96 consecutive patients (192 breasts) who had an inferior pedicle technique were analysed. The breast complication rate was 9.36 % and the patient complication rate 19.79 %. Postoperative blood loss ranged from 0 to 305 ml with a mean of 56.03 ml and a median of 50 ml.

The described method could be considered a variation of the tumescent technique used in liposuction. The results is an almost bloodless dissection with minimal postoperative blood loss. It should be possible to dispense with the use of drains in most cases.

ZUSAMMENFASSUNG

Die Infiltrationstechnik bei der reduzierten Mamoplastik. Die Ergebnisse von 192 aufeinanderfolgenden Brustoperationen

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Die Anwendung der lokalen anästhetischen Infiltration mit Adrenalin wird jetzt für sichere Methode bei der reduzierten Mamoplastik gehalten. Jedoch diese Technik wird oft von denjenigen, die sie benutzen, unklar angegeben.

Jede Technik, wenn sie effektiv sein soll, muß die neurovaskuläre Anatomie der Brust in Betracht ziehen. Wir schlagen die Anwendung vom großen Umfang des verdünnten Lokalanästhetikum (20 ml Lignokains und 1 mg Adrenalins in 400 ml in die physiologische Lösung einmischen), das in den retroglandularen Raum 15 Minuten vor dem chirurgischen Eingriff appliziert wird.

Bei 96 Patienten (192 der Brüste), bei denen die untere Stieltechnik angewandt wurde, wurden die Ergebnisse analysiert. Das Prozent der Brustkomplifikationen war 9,36 %, das Prozent der Komplifikationen bei den Patienten war 19,7 %, der postoperative Blutverlust schwankte von 0 bis 305 ml, im Durchschnitt 56,03 ml und mit Mittelpunkt 50 ml.

Diese beschriebene Methode kann für die Variation zur Anschwellung verursachende Technik, die bei der Liposuktion angewandt wird, gehalten werden. Das Ergebnis ist fast der nichtblutige Schnitt mit dem minimalen postoperativen Blutverlust.

Key words: breast, reduction mammoplasty, local anaesthesia

The use of local anaesthetic infiltration during breast reduction surgery is not new (Mottura, 1992; Blomqvist, 1996; De Bono, 1997), while the additional use of adrenaline has been shown to be both safe and beneficial in terms of reducing blood loss (Varma, 1990; Bretteville-Jensen, 1974; Brantner, 1985). Indeed, in combination with intravenous sedation it is now possible to carry out breast reductions as day case procedures (Zukowski, 1996).

While the various authors mentioned use different mixtures and concentrations of local anaes-

thetic solutions with adrenaline, their description of the infiltration technique is often unclear. De Bono and Rao (7) carry out their infiltration along the planned incision lines and into the „subcutaneous and deeper tissues“ but avoid infiltrating the nipple pedicle. Zukowski et al. (19) use a „sequential layered injection technique“ down to the level of the pectoralis major muscle to overcome the problem of injecting through dense and firm breast tissue. They also recommend infiltrating at the deep dermal level along the pedicle prior to deepithelialisation and emphasise the importance

of infiltrating laterally to block the lateral intercostal nerve branches. Mottura (13) mentions infiltrating in the retroglandular space to block the perforants of the intercostal nerves.

The aim of local anaesthetic infiltration with adrenaline during breast reduction surgery is to produce analgesia and to reduce blood loss. Therefore it is logical that any infiltration technique must take account of the neurovascular anatomy of the breast.

NEUROVASCULAR ANATOMY OF THE BREAST

The vascular supply of the central breast mound is via branches and perforators arising from the lateral thoracic artery, intercostal vessels, thoracoacromial artery and internal mammary perforators. They enter the gland posteriorly either by perforating the overlying chest wall musculature or by passing superficial to the muscles (Hester, 1985).

Although some dispute exists in the literature regarding sensory innervation of the breast, two recent articles have helped to clarify the situation (Sarhadi, 1996; Jaspars, 1997). Medially the breast is supplied by the anterior cutaneous branches of the Ist - VIth intercostal nerves and laterally by the lateral cutaneous branches of the IInd - VIIth intercostal nerves. They enter the breast posteriorly (9).

Therefore a maximum vasoconstrictor effect is likely to be achieved if adrenaline is placed in a retroglandular position around the site of the perforating vessels. Maximal and rapid analgesic effect is also likely if the local anaesthetic is placed where the nerves enter the breast tissue posteriorly.

We describe in detail our technique of infiltration which was devised by NDC. This method was used by the senior author (SND) for 12 years prior to retirement.

PATIENTS AND METHODS

The last 96 consecutive bilateral breast reductions (192 breasts) of the senior author (SND) were reviewed from the case notes. All breast reductions were performed under general anaesthesia with supplemental local anaesthetic infiltration. An inferior pedicle technique was used in all patients. None had free nipple grafting. Drains were used routinely and the postoperative drainage was recorded. Intraoperative blood loss was not measured as this was minimal.

INFILTRATION TECHNIQUE

The solution used is comprised of 20 ml of 1% lignocaine and 1 ml of 1:1000 (1 mg) adrenaline made up to a volume of 400 ml with 0.9% saline. Following induction of general anaesthesia and prior to draping, 200 ml is injected into each breast. A time elapse of at least 15 minutes is allowed prior to commencing the operation.

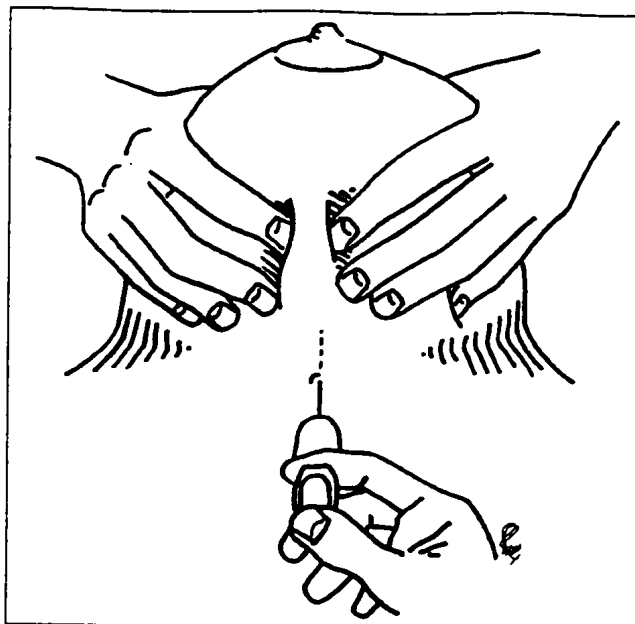


Fig. 1. As the assistant distracts the breast from the chest wall, a 20 gauge spinal needle is passed into the retroglandular space along the plane of the pectoral fascia.

An assistant grasps the breast to be infiltrated and distracts it from the chest wall by vertical traction. A 20 gauge spinal needle is then passed between the breast tissue and pectoralis major muscle along the plane of the pectoral fascia taking care not to enter the thoracic cavity (Fig. 1). The breast is divided into four quadrants (inferior, lateral, superior and medial). Each quadrant is infiltrated in turn with 30 ml of solution. The needle is initially placed beneath the central part of the quadrant and 5 ml is injected. A further 5 ml is injected on withdrawal. The needle is not removed completely but is then angled at 45° and fully advanced. A further 5 ml is

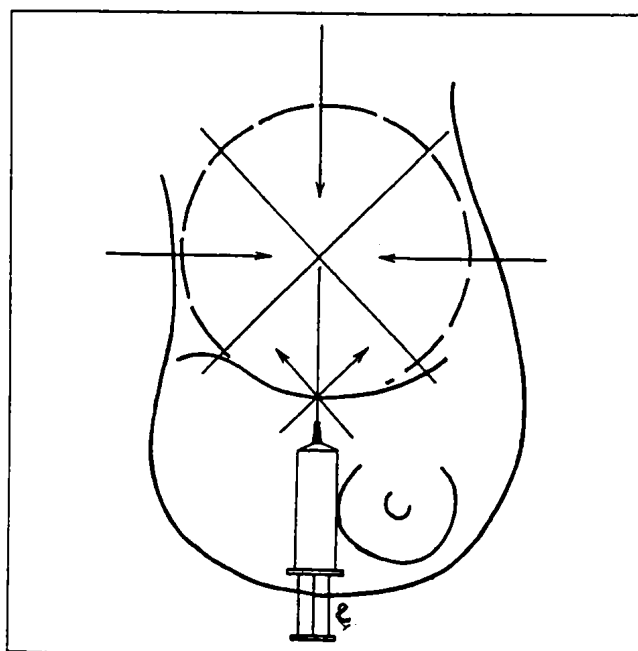


Fig. 2. Each quadrant of the breast disc is infiltrated by three passes of the needle.

injected and again on withdrawal. Finally the quadrant is completed by angling the needle 45° from the central injection point and the procedure is repeated (Fig. 2). The medial quadrant is injected by the assistant while the medial quadrant of the contralateral breast is infiltrated by the operator. The procedure then continues on the opposite side with the operator distracting the breast and the assistant infiltrating. A total of 120 ml of solution is injected into the retroglanular space of each breast. This also includes infiltrating beneath the nipple pedicle. The remaining 80 ml is then injected along the proposed incision lines and into the skin that is to be deepithelialised. Any remaining solution can be injected around the proposed exit site of the drain and into the breast tissue proper in the upper outer quadrant where the lateral flap is thinned.

RESULTS

The mean age of the patients was 32.7 years (range 16 - 60 years) and the mean weight of the total breast tissue excised was 1478 mg (range 408 - 4480 mg). Postoperative complications are listed in Table 1. The overall complication rate was 19.79 % in terms of the number of patients effected and 9.36 % in terms of the number of breasts effected.

Table 1. Postoperative complications (n = 192 breasts)

Complications	No. of breasts	Percentage
Haematoma	1	0.52
Minor Wound Problems	7	3.64
Wound Breakdown	2	1.04
Wound Infection (Proven)	4	2.08
Fat Necrosis	0	0
Total NAC Necrosis	2	1.04
Partial NAC Necrosis	2	1.04
Total	18	9.36
Complication rate:		
Breasts	18/192	(9.36 %)
Patients	19/96	(19.79 %)

(NAC = Nipple Areolar Complex)

There were no complications attributed to the technique of infiltration and there was no evidence of systemic lignocaine toxicity in any case. The mean postoperative blood loss was 56.03 ml (range 0 - 305 ml), the median being 50 ml. No patient required a blood transfusion.

DISCUSSION

The technique described allows the placement of a large volume of fluid in the retroglanular space. The result is an almost bloodless dissection with minimal postoperative blood loss even

though the concentration of adrenaline is only 1:400,000. This is akin to the technique used in tumescent liposuction. The reasons for the minimal blood loss noted in tumescent liposuction have been discussed in detail by Samdal et al. (15). Although adrenaline has some effect, it would appear that the large volume of fluid used results in compression of the vascular structures. We are of the opinion that the same mechanisms are at work in this application of the technique. In those patients with very large breasts it may be necessary to use even larger volumes of fluid. We have used 800 ml of the solution described on several patients without any adverse clinical effects.

However, safety concerns about using large volumes of local anaesthetic solutions in breast reduction surgery have been expressed by Bostwick (2). The main concern is the delayed absorption of a potentially toxic dose of lignocaine. As is probably the case with tumescent liposuction, a considerable portion of the anaesthetic solution is removed with the specimen. Indeed, Ochoa and Yrausquin (14) demonstrated no evidence of lidocaine toxicity up to a maximum dose of 18 mg/kg used for a unilateral reduction of 2500 gm, and they noted that peak serum levels of lidocaine occurred between 6 and 9 hours post injection. Mottura (13) has also published examples of lidocaine plasma levels measured during surgery at 15, 30, 45, 60, 90 and 120 minutes using a fluorescence polarisation immunoassay. In all samples, serum lidocaine levels remained very low. In our technique, the dose of lignocaine used is within the accepted dose limitations of 5 mg/kg up to a maximum of 500 mg (5). However, much higher doses are clearly quite safe when more dilute lignocaine (0.05% or 0.1%) with adrenaline is infiltrated slowly into relatively avascular subcutaneous fat. Up to 52 mg/kg has been used during tumescent liposuction without adverse clinical effects (Klein, 1993).

Another potential complication is the production of an iatrogenic tension pneumothorax during infiltration of the breast (Kaye, 1995). Care must be taken when injecting the retroglanular space not to enter the thoracic cavity. It is probably more likely to occur on the lateral side where the chest wall curves laterally away from the breast disc. It is important to bend the needle and introduce it by angling it upwards parallel to the convexity of the chest wall in order not to enter the pleural space inadvertently. We have not seen any instances of this life-threatening complication.

The complication rate in this series is in keeping with other reported series (De Bono, 1997; Mandrekas, 1996; Schnur, 1997) and once again confirms the fact that use of adrenaline during reduction mammoplasty does not contribute to morbidity (De Bono, 1997). Budny et al. (6) have demonstrated quite clearly that the only variable which independently contributes significantly to

the complication rate in breast reduction surgery is a high body mass index and the use of local anaesthesia with adrenaline does not contribute to the complication rate. However, because we infiltrate the pedicle, nipple/areolar complex (NAC) observation in the immediate postoperative period can be difficult as they are invariably pale and cold. The circulation returns to normal 3 to 4 hours later. If the NAC fails to reestablish its circulation after 5 to 6 hours, then a free graft should be performed. No free grafts were performed in this series. The two total NAC losses could have been prevented by delayed free NAC grafting, but this incidence of NAC loss is similar to other series that use the inferior pedicle technique (De Bono, 1997; Mandrekas, 1996; Schnur, 1997).

Because of the retrospective nature of this study it was not possible to assess postoperative pain control. Although it is our clinical impression that these patients are relatively comfortable in the postoperative period, one could legitimately question the use of a local anaesthetic with a relatively short half-life. The first author (JOD) now adds 20 ml of 0.5% bupivacaine to the solution as well as 1500 IU of hyaluronidase to aid spreading of the fluid in the planned tissue planes.

The mean postoperative drainage was 56.03 ml (range 0 - 305 ml). This suggests that it should be possible to dispense with drains in most cases. However, convention and perhaps fear of the unknown have prevented us from taking this leap of faith. Nevertheless, patients are no longer cross matched and postoperative haemoglobin checks are not performed.

In summary therefore, we propose that the use of a large volume of dilute local anaesthetic solution placed judiciously in the retroglandular space is both helpful and safe during reduction mammoplasty. The method described could be considered a tumescent technique.

REFERENCES

1. Blomqvist, L., Sellman, G., Strombeck, J. O.: Reduction mammoplasty with adrenaline infiltration: effects on perioperative bleeding. *Scand. J. plast. reconstr. Hand Surg.*, 30: 29-32, 1996.

2. Bostwick, J.: Breast reduction under intravenous sedation: A review of 50 cases (Discussion). *Plast. reconstr. Surg.*, 97: 957-958, 1996.
3. Brantner, J. N., Peterson, H. D.: The role of vasoconstrictors in control of blood loss in reduction mammoplasty. *Plast reconstr. Surg.*, 75: 339-341, 1985.
4. Bretteville-Jensen, G.: Mammoplasty with reduced blood loss: effect of Noradrenaline. *Br. J. plast. Surg.*, 27: 31-34, 1974.
5. British National Formulary: British Medical Association and Royal Pharmaceutical Society of Great Britain, 34: 541-542, 1997.
6. Budny, P. G. B., Vesley, M., Coleman, D. J.: The effect of body weight and body mass index on outcome and complication rates in breast reduction surgery. Proceedings: Summer meeting of British Association of Plastic Surgeons, 1996.
7. De Bono, R., Rao, G. S.: Vasoconstrictor infiltration in breast reduction surgery: Is it harmful? *Br. J. plast. Surg.*, 50: 260-262, 1997.
8. Hester, T. R., Bostwick, J., Miller, L., Cunningham, S.: Breast reduction utilising the maximally vascularized central breast pedicle. *Plast. reconstr. Surg.*, 76: 890-898, 1985.
9. Jaspars, J. J. P., Posma, A. N., Van Immerseel, A. A. H., Gittenberger-de Groot, A. C.: The cutaneous innervation of the female breast and nipple-areola complex: Implications for surgery. *Br. J. plast. Surg.*, 50: 249-259, 1997.
10. Kaye, A. D., Eaton, W. M., Jahr, J. S., Nossaman, B. D., Youngberg, J. A.: Local anaesthesia infiltration as a cause of intraoperative tension pneumothorax in a young healthy woman undergoing breast augmentation with general anaesthesia. *J. clin. Anaesth.*, 7: 422-424, 1995.
11. Klein, J. A.: Tumescent technique for local anaesthesia improves safety in large-volume liposuction. *Plast. reconstr. Surg.*, 92: 1085-1098, 1993.
12. Mandrekas, A. D., Zambacos, G. J., Anastasopoulos, A., Haspas, D. A.: Reduction mammoplasty with the inferior pedicle technique: early and late complications in 371 patients. *Br. J. plast. Surg.*, 46: 442-446, 1996.
13. Mottura, A. A.: Local anaesthesia in reduction mastoplasty for out-patient surgery. *Aesth. plast. Surg.*, 16: 309-315, 1992.
14. Ochoa, J., Yrausquin, E.: Anestesia local en cirugía de las mamas. *Gaceta Med.*, Caracas, 99: 31, 1991.
15. Samdal, F., Amland, P. F., Bugge, J. F.: Blood loss during liposuction using the tumescent technique. *Aesth. plast. Surg.*, 18: 157-160, 1994.
16. Sarhadi, N. S., Shaw Dunn, J., Lee, F. D., Soutar, D. S.: An anatomical study of the nerve supply of the breast, including the nipple and areola. *Br. J. plast. Surg.*, 49: 156-164, 1996.
17. Schnur, P. L., Schnur, D. P., Petty, P. M., Hanson, T. J., Weaver, A. L.: Reduction mammoplasty: An outcome study. *Plast. reconstr. Surg.*, 100: 875-883, 1997.
18. Varma, S. K., Henderson, H. P.: A prospective trial of adrenaline infiltration for controlling bleeding during surgery for gynaecomastia. *Br. J. plast. Surg.*, 43: 590-593, 1990.
19. Zukowski, M. L., Ash, K., Klink, B., Reid, D., Messa, A.: Breast reduction under intravenous sedation: A review of 50 cases. *Plast. reconstr. Surg.*, 97: 952-956, 1996.

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