G Chir Vol. 31 - n. 4 - pp. 151-153
Aprile 2010

Ultrasound scissors versus electrocautery in axillary dissection: our experience

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SUMMARY: **Ultrasound scissors versus electrocautery in axillary dissection: our experience.**

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The ultrasound scissors are recently emerging as an alternative surgical tool for dissection and haemostasis and have been extensively used in the field of minimally invasive surgery. We studied the utility and advantages of this instrument compared with electrocautery to perform axillary dissection.

The operative and morbidity details of thirty-five breast cancer patients who underwent axillary dissection using the ultrasound scissors were compared with 35 matched controls operated with electrocautery by the same surgical team. There was no significant difference in the operating time between the ultrasound scissors and electrocautery group (36 and 30 mins, $p>0.05$). The blood loss (60 ± 35 ml and 294 ± 155 ml, $p<0.001$) and drainage volume (200 ± 130 ml and 450 ± 230 ml, $p<0.001$) were significantly lower in the ultrasound scissors group. There was a significant reduction of draining days in ultrasound scissors group (mean one and four days, respectively $p<0.05$). There was significant difference in the seroma rate between the two groups (10% and 30%, respectively). Axillary dissection using harmonic scalpel is feasible and the learning curve is short. Ultrasound scissor significantly reduces the blood loss and duration of drainage as compared to electrocautery.

RIASSUNTO: **Forbici ad ultrasuoni *versus* elettrobisturi nella dissezione ascellare: nostra esperienza.**

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Le forbici ad ultrasuoni da qualche tempo vengono impiegate come strumento chirurgico per dissezione ed emostasi. Fino ad ora impiegate nella chirurga minimamente invasiva, ne abbiamo testato efficacia ed utilità nella dissezione ascellare, paragonando i dati emersi dal loro utilizzo in 35 cancri della mammella con 35 casi controllo nei quali è stato impiegato l'elettrobisturi.

Non sono emerse differenze nel tempo di esecuzione dell'intervento, al contrario sono state registrate significative differenze nella riduzione del sanguinamento e del drenaggio post-operatorio.

Le forbici ad ultrasuoni, in conclusione, si sono dimostrate uno strumento chirurgico di facile utilizzo che agevola l'esecuzione della dissezione ascellare.

KEY WORDS: Axillary dissection - Ultrasound scissors.
Dissezione ascellare - Forbici ad ultrasuoni.

Introduction

Despite the emergence of breast conservation surgery and the sentinel node biopsy, axillary dissection (AD) remains the most commonly performed operative procedure on lymphatic system for breast cancer today (1). Conventional AD using electrocautery or ultrasound scissors is associated with a moderate degree of operative morbidity in 35-50% of patients (2, 3). Much of this morbidity has been attributed to the large post limphadenectony raw area, cut lymphatics and use of electrocautery (4, 5). Ultrasonic dissection using the ultrasound

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scissors has recently emerged as a safe alternative to electrocautery. This has been used extensively in laparoscopic surgery for surgical dissection (6), and initial experience in "open" surgery suggests that it could significantly diminish the blood and serum loss and the operation time (7).

With this background we have initiated the work with ultrasound scissors AD in our Units and standardised the operative technique (8). In this study we compared the operative details and morbidity of 35 ultrasound scissor ADs with 35 matched controls undergoing AD with electrocautery.

Patients and methods

Thirty-five operable breast cancer patients planned for surgery between January 2008 and September 2008 underwent AD with ultrasound scissors (Harmonic Wave 18 S, Ethicon, Endosurgery Inc., USA) after an informed consent. The control group consisted of 35 breast cancer patients, matched for age, body surface area (BSA) and stage of disease, operated by the same surgical team using electrocautery during the same period. Blood loss was estimated by weighing the dry sponges pre-operatively and subtracting such weight from the weight of the used sponges (9). A record of operating time, blood loss, 24-hours drain volume and drain days was kept. Drains were removed when the drainage volume was less than 30 ml/ 24 hours. All the patients were evaluated for the development of haematoma, flap necrosis, wound infection and seroma during follow-up.

A matched pair analysis was performed between two groups using a computerised statistical package (Statistix Version 4.0, Analytical software Co Ltd, USA). The Wilcoxon sign rank test and Mc Nemar's test were used as appropriate and "p"<0.05 was taken as significant.

Ultrasound scissor AD

Flaps were raised using the coagulating shears (CS) attachment of harmonic scalpel. The blunt edge of the open CS blade was used for flap dissection and coaptive coagulation mode was used to occlude and transect the blood vessels more than 3 mm diameter. Axillary dissection was performed using the ultrasound scissors. During the axillary dissection coaptive coagulation mode with a power setting of 3/5 was used to achieve a better sealing of lymphatics and blood vessels. A standard level III clearance was performed. No suture material or electrocautery was used for haemostasis (8).

Electrocautery AD

AD was performed in a standard fashion using electrocautery (Valley Lab, USA). Haemostasis was secured using electrocautery or silk ties as appropriate.

Results

The age, body surface area and stage of the two groups were comparable. There was no significant difference in the operating time between the ultrasound scissors and electrocautery group (36 and 30 mins, p>0.05). Blood loss was significantly lower in the ultrasound scissors group as compared to electrocautery group (60 ± 35 ml and 294 ± 155 ml, p<0.001). Total volume of drainage in the ultrasound scissors group was significantly lower than in the electrocautery group (200 ± 130 ml and 450 ± 230 ml, p<0.05) and the average number of drain days was also significantly less in the ultrasound scissors group (two and four days, p<0.001). None of the patients in both groups developed wound infection, flap necrosis or post-operative haematoma. Three patients in the ultrasound scissors group developed seromas compared to five patients in the electrocautery group . This was not statistically significant (p>0.05).

Discussion

AD performed using electrocautery is associated with a moderate degree of morbidity (2, 3) as blood loss, haematoma, flap necrosis, seroma and prolonged axillary drainage. Tejler et al. (2) reported a post-axillary dissection morbidity rate of 35% in a series of 385 breast cancer patients and found that 17% of the total hospital stay was due to post axillay dissection morbidity. Recent studies (4, 5) have shown that cautery associated thermal tissue injury causes damage of subdermal vascular plexus and incomplete occlusion of vascular and lymphatic channels, leading to increased morbidity.

Recently ultrasound scissors are emerging as an alternative surgical tool for dissection and haemostasis especially in the field of minimally invasive surgery. Ultrasonic waves at a frequency of 55,000/second are generated by the ultrasound scissors for tissue dissection and haemostasis. Although it has been extensively used in laparoscopic surgery (6), experience with the ultrasound scissors in "open" surgery is limited. The ultrasound scissors have recently been used in thyroid surgery and found to be associated with lower operating time and blood loss (7). Initially the ultrasound scissors procedure took a longer time than conventional axillary dissection; however the operating time decreased with experience and the mean operating time is presenly comparable with electrocautery.

The blood loss and drain days were significantly lower in the ultrasound scissors group. Ultrasonic energy generated by the ultrasound scissors causes the breakdown of hydrogen bonds and formation of denatured protein coagulum. This coagulum seals off the vessels and lymphatics inducing decreased blood loss and lymphatic drainage. Lateral thermal injury has been shown to be halved with the harmonic scalpel as compared to electrocautery in animal models (10), potentially decreasing the flap necrosis rate. We did not register flap necrosis in either group. Historical data from the authors' unit show a flap necrosis rate of 4% using electrocautery. The small number of patients could explain this apparent difference in

outcome. Apart from being a better haemostatic tool than electrocautery, the ultrasound scissors have an added advantage of multifunctionality, avoiding frequent instrument changes and use of sutures. Haemostasis was achieved in all patients of the ultrasound scissors group without ligature, clamp or cautery.

Conclusion

Axillary dissection can be safely performed using ultrasound scissors with a significant reduction in the blood and serum loss and duration of drainage compared to electrocautery.

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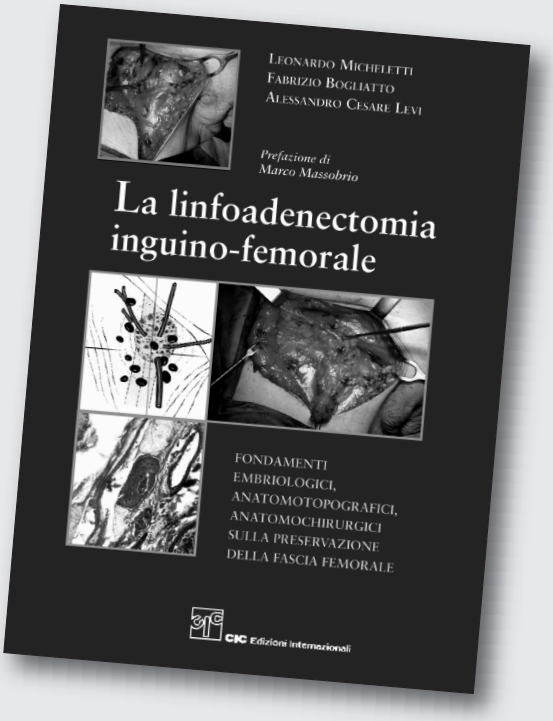

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