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The Use of the Veress Needle to Drain Mammary Periprosthetic Fluid

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Abstract. *Background: The most common early complications associated with mammary implants are seroma and haematoma formation, and acute infection. The aspiration of fluid around the prosthesis can help to diagnose and correctly treat these complications. The use of a needle with a sharp tip can damage the implant. We present our experience in removing periprosthetic fluid using the atraumatic Veress needle. Patients and Methods: Twelve patients with breast implants presented with a progressive monolateral breast enlargement. Ultrasound examination revealed the collection of fluid around the implants. Ultrasound-guided percutaneous needle aspiration of the fluid was performed using the Veress needle. Results: No complications were reported. None of the implants was found to be damaged at the ultrasound assessment. Conclusion: Our proposed use of the Veress needle is similar to the use for which it was designed. Indeed, we used the device to remove some fluid from a real cavity. This procedure proved to be effective and safe.*

Since their introduction in 1962, silicone breast implants have been used throughout the world for both aesthetic and reconstruction purposes (1). It is estimated that between two and three million women currently have silicone breast implants (2). Over the years, there has been growing concern regarding their safety. Recent studies have documented a significant incidence of local complications and side-effects due to breast implants (3-24). The use of mammary implants may lead to a variety of both early and late complications. The most common early complications are seroma and haematoma formation and acute infection. These complications may ultimately lead to the extrusion of the prosthesis. Although seroma and haematoma accumulation within the capsule may develop months, or even years, later, there are few reports and no data on the incidence of these complications in the literature.

The aspiration of the fluid around the prosthesis can help to diagnose and correctly treat infection, seromas and haematoma. The best approach to treat a mammary prosthesis infection is the removal of the implant, followed by antibiotic therapy and a period of approximately 6 months without any implant to allow the body eliminate the germ responsible (15). Only then is it considered safe to reintroduce the prosthesis. This treatment modality may, however, result in marked breast asymmetry in the patient and, consequently, in psychological suffering. By contrast, the treatment of a breast seroma or haematoma may often be treated more conservatively, and when a surgical approach is required, a new implant may be reintroduced immediately.

A needle is required to aspirate the fluid around the prosthesis; however, the use of a needle with a sharp tip, even under ultrasound guidance, can damage the implant, which will then need to be replaced. Furthermore, in some countries in the Western world (*e.g.* the United States), the procedure of needle evacuation of fluid collection around mammary implants is seldom covered by health insurance policies owing to the high risk of implant damage and replacement.

Veress designed a needle to prevent damage to the lungs or abdominal organs during removal of fluid from the thoracic or peritoneal cavities and in the treatment of pneumothorax. We present a series of twelve cases in which we removed breast periprosthetic fluid using this atraumatic needle.

Patients and Methods

From July 2006 to March 2008, twelve patients with breast implants came to the Department of Plastic Surgery of the La Sapienza University of Rome because of a progressive monolateral breast enlargement. The patients' age ranged between 25 and 58 years (mean: 41.5 years; median: 39 years); four of these patients had undergone bilateral mammoplasty in our department some days

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before, six had undergone bilateral mammoplasty in our department between February 2003 and April 2005, while the remaining two patients had undergone the same operation elsewhere between 18 and 24 months before. Indications for primary surgery had been hypomastia in 8 cases and bilateral mastectomy in 4 cases. The implants were placed in a subglandular pocket for breast augmentation, and in a submuscular pocket (under the pectoralis major and serratus muscles) for breast reconstruction.

The physical examination revealed breast asymmetry with monolateral breast enlargement (right side in 8 cases and left side in 4 cases). Ultrasound examination of the enlarged breasts showed a large amount of fluid surrounding the implants. We proceeded to perform ultrasound-guided (Mylab 70 ESAOTE Genova, Italy, using 7.5 Mhz echographic probe Aplio Toshiba Medical System Otawara-shi, Tochigi-ken, Japan) (Figure 1) percutaneous needle aspiration of the fluid using a disposable Veress needle (Coviden TYCO, Princeton, NJ, USA). Before aspiration, local anaesthesia with lidocaine 2% was administered.

Technical details. The Veress needle comprises a sharp, pointed external sheath with a special grip on the outside, and a long, hollow needle with a blunt tip, which moves within the sheath (Figure 2). This inner hollow needle is connected to a spring whose tension is adjustable. The instrument is inserted vertically through the skin whilst the skin is under traction. Since the skin offers some resistance, the blunt end of the inner needle, which is slightly longer than the sharp external sheath, is pushed back in such a way as to place the spring on the inner needle under tension. The spring thus remains under tension until the sharp tip of the external sheath has penetrated the skin. After penetration, when resistance drops, the blunt inner needle automatically pushes itself beyond the sharp tip of the external sheath. The instrument is thus provided with a blunt end, which will not damage the mammary implant (Figure 3). The operator merely has to adjust the position of the blunt end with the help of a special bolt. The instrument can then be safely moved within the cavity and aspirate the periprosthetic fluid (Figure 4). Fluid samples are then sent for cytological examination and culture.

Results

It was possible to almost completely remove the periprosthetic fluid in all the cases, as confirmed by the ultrasound assessment. The volume of aspirated fluid ranged between 90 and 350 ml. Culturing techniques of the fluid samples excluded prosthesis infection, while the cytological examination led to a diagnosis of early haematoma in 3 cases, early seroma in 1 case and late seromas in the remaining 8 cases. No complications were reported either during the aspiration procedure or in the following days. The patients referred only mild pain during local anaesthesia. None of the implants was damaged at the ultrasound assessment.

Revisional surgery was subsequently planned in the 8 cases with late seromas owing to symptom recurrence, characterized by pain and breast enlargement between 2 and 10 days after evacuation of the seroma. Six monolateral late seromas had developed after breast augmentation, two after breast reconstruction. The implants were removed in all cases; the new implants were reintroduced during the same operation in the patients with augmented breasts alone, and positioned in a newly prepared submuscular pocket after the capsulectomy. In the reconstructed breasts, a new implant was reintroduced in the same submuscular pocket only after 6 months. None of the removed implants presented macroscopic or microscopic signs of rupture.

No fluid accumulation was observed during the follow-up (between 6 and 24 months) in any of the cases treated (4 conservatively and 8 with surgery).

Discussion

The Veress needle was designed for the removal of fluid from the thoracic and peritoneal cavities and for the treatment of pneumothorax. Veress designed his needle in such a way as to prevent damage to the lungs or abdominal organs. He was acutely aware of the potential injury to underlying viscera when a sharp needle is introduced into the thoracic or abdominal cavity. He believed the design of the needle would prevent visceral injury; he did not report any complications in a series of almost 2000 pneumothoraces (16). The use of the Veress needle in cases of pneumothorax is, however, unlikely to be associated with injury to the underlying organs (17).

Today, this needle is used in laparoscopic procedures to gain access to the peritoneal cavity for the creation of pneumoperitoneum (18). However, the insertion of the Veress needle itself is not complication-free as it can cause injury to the intrabdominal organs (19), as has been confirmed in recent general surgical practice (20-22). Furthermore, it has been shown that intrabdominal organs are prone to trocar injury even after successful pneumoperitoneum. Indeed, the insertion of the Veress needle or trocar is responsible for a substantial number of injuries during laparoscopy; the complication rate of Veress needle or trocar insertion during closed laparoscopy is reported to be 0.2-0.3% (20-22). Furthermore, the Veress needle has been implicated in more vascular accidents during laparoscopy than the trocar (21), with many non-comparative/randomized series confirming the safety of direct trocar insertion (23-25).

It should, however, be borne in mind that the needle is being used for purposes for which it was not originally designed, which may explain why there is currently a higher incidence of complications than that reported by Veress. The higher incidence of complications during laparoscopic procedures is due to the fact that the Veress needle in such procedures is used to gain access to a virtual cavity to create a pneumoperitoneum, and that once the tip penetrates the abdominal wall it does not find a real space, but abdominal organs.

Our proposed use of this needle is more similar to the purpose for which it was originally designed. Indeed, we use the needle not to insert something into a virtual cavity (*e.g.* the abdominal cavity), but to remove fluid from a real cavity,

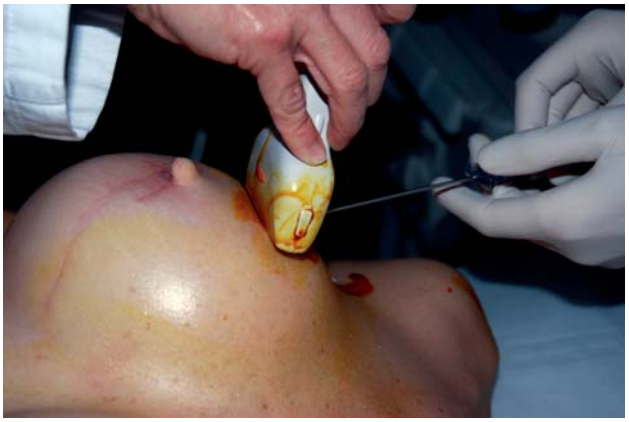

Figure 1. *Ultrasound-guided percutaneous needle aspiration of periprosthetic fluid using a disposable Veress needle.*

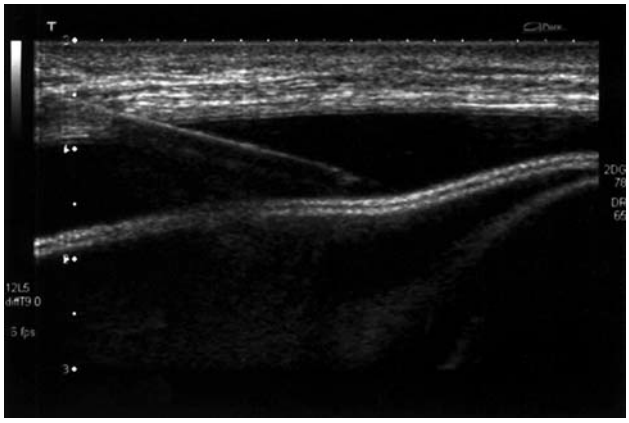

Figure 3. *Ultrasound image showing the position of the needle tip during the procedure.*

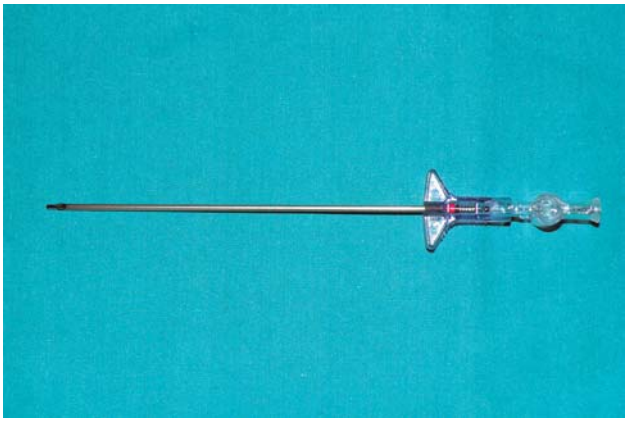

Figure 2. *Disposable Veress needle.*

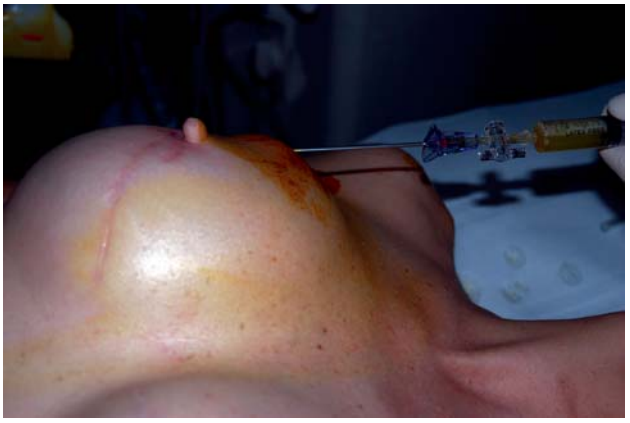

Figure 4. *Periprosthetic fluid being aspirated by means of the Veress needle.*

which explains why none of the mammary implants in our series ruptured. Furthermore, we do not perform the procedure 'blindly', but used ultrasound guidance to insert the needle tip (Figure 3). The prosthesis is protected by the space occupied by periprosthetic fluid. The moment in which the needle penetrates the periprosthetic pocket is crucial because the implant can be damaged by the instrument tip, the sharp needle tip being required to penetrate the skin. However, once the pointed tip is within the periprosthetic cavity and poses a danger, the blunt end of the spring-loaded cannula advances automatically, thereby protecting the implant. However, when we remove the fluid and the cavity collapses and shrinks in size, there is less space to move the needle without damaging the implant. By performing the procedure under ultrasound guidance, we can constantly follow the needle's position.

As demonstrated by ultrasound imaging, the use of the Veress needle to remove mammary periprosthetic fluid is safe, fast, effective and complication-free. Lastly, fluid drainage allowed us to diagnose the cause of the breast enlargement and to correctly treat the affected patients.

Moreover, it should be borne in mind that the procedure of needle evacuation of fluid collection around mammary implants in some countries in the Western world is seldom covered by health insurance policies owing to the high risk of damage to the implant, and further expense to replace it, when a conventional sharp needle is used. The demonstration of the safety of the Veress needle may change health insurance opinion on this procedure. In view of the benefits resulting from a correct diagnosis and treatment of periprosthetic fluid collection, insurance companies may decide to cover the evacuation procedure with the Veress

atraumatic needle. However, further studies designed to confirm our findings on the use of this device are warranted.

In conclusion, the use of the Veress needle puncture system affords an effective, safe means of reaching the periprosthetic cavity after mammary implantation.

Conflict of Interest Statement

None of the authors has a financial or personal interest in any of the products, devices, or drugs described in this article and did not received funding for this work from any organization.

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