

# Treatment of persistent complex seroma postventral incisional hernia repair by capsulectomy and scarification using argon beam coagulator

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## SUMMARY

We present a case of chronic complex seroma following ventral incisional hernia repair with a mesh. The patient was managed initially conservatively by observation followed by multiple percutaneous aspirations and tube drainage. After 6 months of conservative management, the patient remained symptomatic and the surgical scar showed evidence of ulceration, skin necrosis and sinus formation. Therefore, a definitive surgical treatment in the form of capsulectomy and scarification using argon beam coagulator was performed. He remained asymptomatic with no sign of seroma development or hernia recurrence at a 3-year follow-up.

## BACKGROUND

Seroma formation is a common complication following ventral hernia repair due to anatomical dead space creation.<sup>1</sup> Extensive dissection and mesh placement in a large dead space predispose to postoperative seroma formation.<sup>2-3</sup> Frequently, postoperative seromas will resolve spontaneously. However, if it persists or becomes symptomatic, surgical intervention may be required.<sup>4-5</sup> Treatment options include conservative management by observation, use of abdominal binders, repeated percutaneous aspirations, closed suction drainage and sclerotherapy.<sup>4</sup> Seromas carry the risk of prolonged hospital stay, delayed wound healing, infection, abscess formation and skin necrosis.<sup>6</sup> Few case studies have been published describing techniques such as tube drainage, use of sclerosing agents such as intracavity steroid (triamcinolone) injections, minimally invasive evacuation and various combinations of techniques. This report aims to present a definitive surgical method for a persistent complex seroma following ventral incisional herniorrhaphy with mesh. This approach entails the combination of capsulectomy and scarification of the remnant pseudocapsule using an argon beam coagulator.

## CASE REPORT

A 60-year-old man, status postlow anterior resection and loop ileostomy for rectal carcinoma. The diverting stoma was taken down after completing his adjuvant chemotherapy. Seven months later, the patient developed an enlarging midline swelling which was confirmed on CT scan to be an incisional hernia (figure 1). This hernia was subsequently repaired by primary fascial closure with an onlay of polypropylene mesh without suction drain insertion. Postoperatively, he developed a subcutaneous

seroma (figure 2) which was initially small and treated with an abdominal binder. After 3 months of observation, the abdominal seroma increased in size and caused discomfort. CT scan confirmed the presence of a large seroma but no evidence of hernia recurrence (figure 3). Fluid aspiration under ultrasound guidance was performed under aseptic technique. Approximately 1500 mL serous fluid was drained. Despite three repeated aspirations, the seroma continued to recur. Moreover, the cytopathology report of the drained fluid at the third aspiration revealed inflammatory cells, numerous bacteria and macrophages in a bloody background, but no malignant cells were seen. The microbiology report was positive for *Enterobacter cloacae*, sensitive to ciprofloxacin, and hence, he was started on antibiotics. Moreover, he developed a patch of skin ulcerations and necrosis. As a result, he had an incision and drainage, as well as the insertion of a tube drain into the cavity for frequent irrigation with saline solution (figure 4).

After recovering from this acute episode, surgical intervention was planned after discussion with the patient. Through a 12-cm midline incision which included the sinus opening, the seroma fluid was evacuated and the pseudocapsule was dissected and excised (figure 5A,B). Intraoperatively, the mesh was intact and the seroma fluid clear with no evidence of mesh infection. The deeper aspect of the pseudocapsule was thoroughly curetted preserving the mesh integrity. Argon beam coagulator was used to scarify the remaining posterior aspect (figure 5C,D) which was attached to the mesh. Haemostasis was secured and the wound was closed over a Jackson-Pratt drain. A pressure dressing and abdominal binder were applied. The surgical pathology of the seroma capsule showed fibrotic tissues, mixed inflammation with focal foreign body type giant cell reaction and granulation tissue formation. No evidence of malignancy was seen.

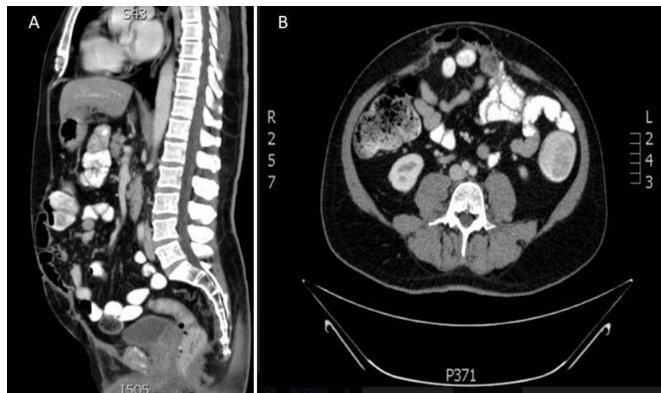
## OUTCOME AND FOLLOW-UP

The patient's postoperative course was uneventful. He was discharged home on day 3 and the drain was removed in the outpatient department on day 7. He was then advised to apply the abdominal binder for 6 weeks. CT scan at 1 year after capsulectomy showed an intact abdominal wall with no seroma formation or hernia recurrence (figure 6). The patient has been followed for 3 years and there was no evidence of recurrence of either the seroma or the hernia.



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**Figure 1** CT scan of the abdomen (A sagittal and B axial view) before hernia repair showing a midline incisional hernia with a wide neck measuring around 9 cm.

## DISCUSSION

Seroma is an exudative fluid collection that most commonly occurs following open ventral hernia repair with mesh. It occurs less frequently after laparoscopic repair (5% of laparoscopic repair vs 8% in open).<sup>4,7</sup> In retrospect, the chance of seroma formation could have been reduced in this case by laparoscopic repair. However, this notion was excluded as the patient had previous major laparotomy with subsequent adhesion formation and a high risk of bowel injury. Moreover, the hernia size was large. One may also argue about the insertion of a drain during the index hernia repair. However, there is no evidence to support that insertion of a drain prevents seroma formation. On the contrary, it may increase the chance of mesh infection.<sup>8</sup>

The pathophysiology behind seroma formation is unclear. However, the incidence increases during onlay procedures as this require extensive subcutaneous dissection. The presence of mesh is a culprit which may trigger a local response.<sup>9</sup> It also disrupts the lymphatic drainage, activates inflammatory markers and disturbs fluid permeability causing seroma to accumulate.<sup>9,10</sup> Moreover, the type of mesh used may well be a contributing factor. Higher rates were noted with the use of polytetrafluoroethylene (5%–15%) compared with polypropylene mesh (4%–8%).<sup>11</sup>

Morales-Conde *et al* described seromas as a complication if it is symptomatic, persisted for more than 6 months or complicated by infection.<sup>12</sup> They also classified seromas into four types: types I and II are the seromas that last for less than 6 months and are considered as a normal postoperative course. Types III and IV are either symptomatic or seromas that last for more than 6 months. Type III seroma does not require any intervention, whereas, type IV requires intervention.<sup>12</sup> Most seromas resolve



**Figure 2** Image of the seroma some weeks after the incisional hernia repair.



**Figure 3** CT of the abdomen after the repair of midline incisional hernia showing large encapsulated fluid collection (approximately 11×17 cm) at the surgical site anterior to the mesh.

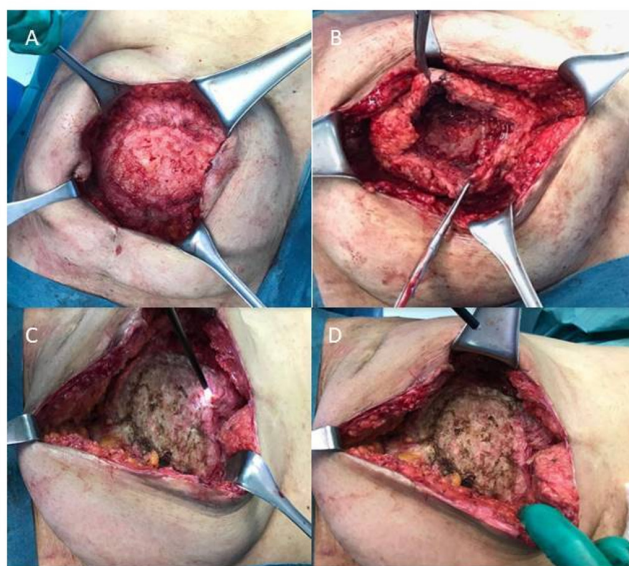
spontaneously within 6–8 weeks and only 2.8% of the seromas may persist after 8 weeks.<sup>13</sup>

Management of a simple seroma includes observation for spontaneous resolution and application of abdominal binders. Percutaneous aspiration or closed suction drainage may occasionally be used if seroma persists and cause discomfort. Complicated seromas can be managed by different strategies such as sclerotherapy, intracavity steroid injections, minimally invasive evacuation, capsulectomy or combinations of two or more methods.

Our case developed chronic seroma following a herniorrhaphy with a 25×20 cm polypropylene onlay mesh. It was managed conservatively by observation for 3 months, but it failed to resolve. The persistent symptomatic seroma was then treated—with reluctance—by repeated percutaneous aspirations. However, the management of seroma postmesh hernia repair by serial percutaneous aspirations, and application of



**Figure 4** Image of the abdomen showing the inserted rubber catheter in the sinus.



**Figure 5** Intraoperative images showing the well-developed thick capsule wall (A), the capsule posterior wall which covers the mesh after excision of the capsule (B), the posterior capsule wall during the application of the argon beam coagulator (C) and the posterior wall after completed scarification by the argon beam coagulator (D).

external abdominal pressure or drainage by tube or both has been reported.<sup>14</sup> Refractory seromas can also be managed by triamcinolone intracavity injections. Moreover, refractory seroma which fails to respond to aspirations may require surgical excision of the cyst wall.<sup>15</sup> In our case, we excised the pseudocapsule and coagulated the remaining pseudocapsule by argon beam coagulator.

Complicated chronic seromas are usually characterised by delayed presentation, large size (>10 cm) and the presence of a pseudocapsule that is isolated from the underlying mesh. Surgical resection (capsulectomy) is the definitive management approach. The ablation of the inner lining of the seroma using argon beam coagulator can be advocated as a treatment option. This novel technique was first used successfully to treat persistent postoperative seromas by Lehr and Schuricht.<sup>4</sup> It involves the evacuation of serous fluid and fibrinous debris, followed by argon



**Figure 6** CT scan of the abdomen, 1-year postcapsulectomy showing intact abdominal wall with no evidence of seroma formation or hernia recurrence.

beam scarification of the seroma cavity lining. The argon beam has thermal properties that can be used to coagulate and ablate the inner lining of the seroma preventing future fluid secretion. The superficial layer of the pseudocapsule overlying the mesh is preserved. Hence, the integrity of the mesh is not disturbed.<sup>4</sup> The argon beam coagulator may not be readily available in every centre. However, we believe the use of diathermy on spray mode may achieve the same objective of scarification; this warrants further substantiation by evidence.

In this case, international guidelines for the management of the persistent seroma were followed. The management was ‘upgraded’ from one treatment option to another. The seroma was first observed, and an abdominal binder was prescribed. When it persisted and caused symptoms, percutaneous aspiration was first used and when aspiration failed and sinus developed, tube drainage was tried. Finally, surgical intervention was done after the failure of all other options. The mesh was preserved and mesh infection was not suspected as future fluid cultures were all negative for organisms.

## CONCLUSION

Various strategies for the management of persistent and complicated seroma postventral hernia repair have been described in the literature. Capsulectomy and scarification using argon beam coagulator is an underutilised treatment modality. It is a good management option for managing persistent complex seroma.

## Learning points

- ▶ Seroma is a well-known complication postventral incisional hernia repair which may be difficult to treat if it persists.
- ▶ Most seromas will resolve spontaneously. However, the surgical intervention must be considered if complications develop.
- ▶ Repeated percutaneous aspirations—though under aseptic technique—may subsequently lead to infection.
- ▶ Capsulectomy and scarification using argon beam coagulator is a good management option for managing persistent complex seroma.
- ▶ Utilising argon beam technology in tackling persistent seroma requires the supervision of a senior experienced surgeon.

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Case reports provide a valuable learning resource for the scientific community and can indicate areas of interest for future research. They should not be used in isolation to guide treatment choices or public health policy.

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