

# Medical talc increases the incidence of seroma formation following onlay repair of major abdominal wall hernias

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## Abstract

**Purpose** Seroma is a well established complication of the repair of major abdominal wall hernias, occasionally requiring aspiration and reoperation. Medical talc seromadesis (MTS) has been described in the literature. The aim of this study was to determine the effect of MTS on seroma formation after onlay repair of incisional hernia.

**Methods** A retrospective review of a prospective database was conducted for 5 months from April 2011, when 21 consecutive patients received MTS. Outcomes were compared with a published and validated series from the same unit.

**Results** There were no differences in basic demographics and co-morbidities between the two groups. The mean BMI was 34 for the MTS group. The incidence of recurrent incisional hernia prior to surgery was greater in MTS (9/21 vs. 36/116,  $p = 0.39$ ). The mean area of fascial defect measured intra-operatively and mesh used to cover the incisional hernia defect was 170 and 309 cm<sup>2</sup> for the MTS group. The mean operating time was 152 min and a mean of 10 g of medical talc was used for seromadesis. The seroma rate increased from 11/116 (9.5 %) to 16/21 (76 %) ( $p = 0.001$ ) as did the rate of superficial wound infection 10/116 (8.6 %) to 9/21 (43 %) ( $p = 0.03$ ) in the MTS

group. There was no difference in the length of in-hospital stay between the two groups.

**Conclusions** The application of medical talc increased the rate of seroma formation and superficial wound infection in patients undergoing open ‘onlay’ repair of major abdominal wall hernia.

**Keywords** Ventral hernia · Onlay repair · Talc · Seromadesis · Seroma

## Introduction

The open onlay mesh repair augmented by relaxing incisions and components separation is a well established technique for repairing large abdominal wall hernias [1–3]. Wound-related complications are common after large abdominal wall hernia repairs combined with wide subcutaneous dissection, seroma being the most frequent of the complications [4, 5]. Many studies have tried to address this problem with measures such as prophylactic placement of postoperative drains, fibrin glue and elastic binders, but each of these measures has had little success [6–8]. Talc pleurodesis has been commonly used for recalcitrant pleural effusion and has been shown to be safe and cost effective [9]. A recent study has shown that the application of medical talc in the subcutaneous space, medical talc seromadesis (MTS), reduces the incidence of seroma formation after open repair of large ventral hernias, when the mesh has been positioned in the preperitoneal space [10].

The aim of this small retrospective series was to determine the effect of MTS on seroma formation after open onlay repair of a major abdominal wall incisional hernia, prior to a potential randomised trial.

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## Methods

### Setting of the study and surgical techniques

Patients undergoing open, onlay mesh repair of major abdominal wall hernias between April 2011 and August 2011 were considered for the study. The Plymouth Hernia Service is a tertiary referral centre, performing more than 80 open repairs of complex, major abdominal wall hernias per year, with patients referred from all areas of the UK. The unit has previously published their outcomes after complex abdominal wall hernia repairs [3]. In line with the institution's policy, a formal application to the Local Ethics Research Committee was not sought for this audit project but all necessary guidelines of research governance including implementation of basic safeguards to ensure patient confidentiality were adhered to.

A major abdominal wall hernia was defined as a hernia with a transverse diameter of more than 10 cm. Large and complex hernias, especially in obese patients, were evaluated with computer tomography (CT) scans to identify the area of fascial defect, contents of the sac, and occult hernias not identified on clinical examination. The surgical technique of hernia repair including that of components separation in cases where a tension-free fascial closure could not be achieved has been well described previously [3]. The fascial closure was supplemented by a lightweight, large pore polypropylene mesh in the onlay position extending beyond the line of closure by at least five centimetres in all directions. Medical talc was applied over the onlay mesh repair and into the subcutaneous layer prior to closure of skin and subcutaneous tissue. The talc was slurried in the subcutaneous space over the onlay mesh repair of the hernia defect. The quantity of talc used was determined by the size of the subcutaneous space. Closed suction drains were applied beneath each skin flap and removed at 14 days or until drainage was less than 50 ml in 24 h.

### Outcomes of treatment

Baseline demographic and clinical information were recorded prospectively into the study database. Information was collected concerning peroperative complications (such as bowel injury) and, postoperative complications (such as seroma, wound infection, wound haematoma), and recurrence. All seromas detected at follow-up in the outpatients' clinic, irrespective of whether they required further interventions were included as a post-operative complication. Superficial wound infection was defined as erythema of the abdominal wound requiring the administration of oral antibiotics. Telephone interviews using a structured questionnaire were conducted at a mean of 6 months after

surgery to assess quality of life, pain, and sensation of any bulging of the wound. Patients who answered positively regarding pain or bulge of the wound were offered a clinic appointment for physical examination. A retrospective review of a prospective database was conducted and outcomes were compared with a published and validated series from the same unit. The surgical technique of incisional hernia repair was exactly identical in the two groups except for the following two points: (a) aerosolised fibrin sealant (spray) was used in the historical cohort but not in the patients in the current study. The spray was applied to the under-surface of the skin flaps, rather than the mesh, because the mesh had been firmly fixed by the application of a peripheral non-absorbable suture between it and the underlying abdominal wall fascia, and (b) closed suction drains applied beneath each skin flap were removed if the drainage was less than 50 ml in 24 h or at post-operative day (POD) five in the historical cohort and POD 14 in the current study. As a result of continuous audit, our practice had changed between these two studies to accomplish a reduction in seroma formation when drains had been left in situ a minimum of 14 days rather than 5 days. The 14 days period is currently our standard practice.

### Statistical analyses

Data were reported as mean/median with ranges and percentages as appropriate. Continuous data were compared with the appropriate parametric and non-parametric tests whilst categorical data were compared using the Chi square tests. All analyses were made using STATA<sup>®</sup> statistical software version 10.0 (StataCorp, College Station, TX, USA).

## Results

### Baseline demographics and co-morbidity

There were 21 patients who underwent MTS in the 5 months from April 2011. The baseline demographics have been outlined in Table 1. There were a similar number of men and women in the group with a median age of 60 years. Pre-existing co-morbidities comprised diabetes in four patients (19 %), hypertension in nine (43 %) and chronic obstructive airway disease in six patients (29 %). There were 16 (76 %) patients who had a body mass index (BMI) of more than 30. The cohort comprised of 12 (57 %) primary incisional hernias and nine (43 %) recurrent incisional hernias. There were 18 (86 %) patients that reported significant deterioration in their ability to perform activities of daily living due to the large incisional hernia.

**Table 1** Baseline demographics of patients undergoing medical talc seromadesis

Baseline demographics	
Age, years	
Median	60
Range	37–79
Male : female	11:10
BMI	
Median	34
Range	27–50
Previous attempted repairs (%)	9 (43 %)
Impairment of ADL (%)	18 (86 %)

BMI body mass index, ADL activities of daily living

### Operative outcomes

Hernias were repaired at a number of sites on the anterior abdominal wall. The mean estimated area of the hernia defect measured intraoperatively was 170 cm<sup>2</sup> (range 36–500 cm<sup>2</sup>) and the mean area of the mesh used to cover this defect was 309 cm<sup>2</sup> (range 160–700 cm<sup>2</sup>). The fascial defect was too large to close without tension in six (29 %) patients, who underwent a components separation. The mean operating time was 152 min (range 60–245 min.). The mean amount of medical talc used for seromadesis was 10 g (range 8–16 g). There were four (19 %) patients that required planned admission to the intensive care unit after surgery and the mean length of hospital stay was 7 days (range 1–31 days).

### Post-operative complications

The post-operative complications are outlined in Table 2. All the patients were seen in outpatients' clinic 4 weeks after discharge from hospital to assess for signs of seroma and other complications. Post-operative seroma was confirmed on clinical examination by a senior member of the surgical team (registrar or consultant) at follow-up in the out-patients' clinic. The mean volume of the seroma was 478 ml (30–4,300 ml), and seven (33 %) patients required repeated aspiration in the out-patients' clinic. There was no evidence of recurrence at the time of follow-up in any of the patients. There were four (19 %) patients who required re-operation within a month after surgery (seroma 3, wound infection 1). There were no post-operative deaths and all patients were alive at the time of telephone follow-up.

### Telephone questionnaire follow-up

Attempts were made to contact all the patients by telephone for a short questionnaire follow-up at a mean of

**Table 2** Post-operative complications in patients undergoing medical talc seromadesis

Type	
Seroma	16 (76 %)
Wound infection	9 (43 %)
Adhesional bowel obstruction	1 (5 %)
Pneumonia	1 (5 %)

6 months (range 5–10 months) after initial surgery, and follow-up was possible in 15 (71 %) patients. There were 12 (80 %) patients who stated that their quality of life was impaired due to the hernia prior to surgery and the same number who stated that surgery had significantly improved their quality of life. There were seven (47 %) patients who reported persistent pain at the time of the telephone follow-up. None of the patients contacted reported a sensation of bulge or symptoms to suggest recurrence of the hernia. There were 13 (87 %) patients who reported that they would recommend the same operation to a friend or family member.

### Comparison of outcomes

The outcomes from the present series were compared with a published and validated series from the same unit [3]. The baseline demographics were similar between the two groups. The seroma rate increased from 11/116 (9.5 %) to 16/21 (76 %) ( $p = 0.001$ ) as did the rate of superficial wound infection 10/116 (8.6 %) to 9/21 (43 %) ( $p = 0.03$ ) in the MTS group. There was no difference in the length of in-hospital stay between the two groups.

### Discussion

This study evaluating the effect of medical talc seromadesis after onlay repair of major abdominal wall incisional hernia shows that application of medical talc significantly increases the rate of seroma formation and superficial wound infection. As a result of the findings of this study, the practice of medical talc seromadesis has been discontinued in our institution.

A previous study reported the successful application of medical talc seromadesis to reduce the incidence of seroma formation and wound complications after open mesh repair of large abdominal wall hernias when the mesh is placed in the preperitoneal space [10]. This study, however, only included seromas requiring further interventions as a post-operative complication. There are two other case-series that have reported the successful application of MTS in

conjunction with argon beam coagulation after recurrent seroma formation following an open onlay repair of abdominal wall incisional herniae [11, 12]. These studies comprised less than five cases, and one of the studies reported a 25 % recurrence of seroma formation after 6 months.

There are very few studies reported in literature that have assessed the role of MTS after an open mesh repair of complex major abdominal wall hernias. The present study is the first of its kind to evaluate the effect of MTS on seroma formation after an open onlay mesh repair of large ventral hernias. The prospective design and high questionnaire compliance rates should minimize selection bias, but nevertheless this study does have limitations. The relatively small sample size prevents results from this study from being generalisable. The small sample size was a consequence of the abandonment of talc seromadesis in our institution after the interim review undertaken in this study that revealed a dramatic increase in the rate of seroma formation after surgery. It is the practice of the Plymouth Hernia Service to achieve excellence through aggregated incremental gains. This intervention represented a logical incremental addition to our established protocols intended to have a positive effect, but which had unintended consequences.

The use of a non-randomised and historical cohort for comparison may also increase the risk of information bias. The telephone questionnaire was not validated as it was introduced before our unit began using the validated Carolina Comfort Score [13]. Telephone follow-up including simple questions regarding pain and the presence of a lump have been shown, however, to be accurate in discovering recurrent hernias, and this is further supported by data from the Swedish hernia database, where clinical follow-up is non-mandatory [14, 15].

The results of the current series are not in agreement with the results in a series in which the mesh was positioned in the preperitoneal space [10]. It is possible that direct contact between the surface of the mesh and the talc particles prevents the rapid fibrinous fixation of the mesh as well as the effective penetration of blood vessels through the pores of the mesh, thereby substantially increasing the rate of seroma formation. In spite of the relatively small sample size, it was felt that the results of this study were of considerable importance with a significant potential to affect clinical practice, when used in the open, onlay method of mesh repair. Future research, preferably through the means of a randomised controlled trial, may address this issue more conclusively. The results of our study may influence an ethical committee to justify a randomised trial

where the risk of seroma formation and wound infection has the potential to be so high.

## Conclusion

This small exploratory study shows that the application of medical talc increases the rate of seroma formation and superficial wound infection in patients undergoing open, onlay repair for major abdominal wall hernia. We would strongly discourage the use of medical talc where an onlay mesh has been placed.

**Conflict of interest** RP, STH, and ANK declare no conflict of interest.

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