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CLINICAL RESEARCH

Subfascial Port Placement in Gastric Banding Surgery

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Abstract
Background In some bariatric patients with predominantly intra-abdominal fat a shallow fat layer separates the gastric band access port from the skin. We hypothesise that subfascial port placement in these patients reduces skin erosions and port infections and improves cosmesis as weight loss occurs.
Aim This study aims to compare port complications, cosmetic outcome and ease of band adjustment with access ports in front of or behind the rectus muscle.
Method We retrospectively compared complications and cosmetic outcomes of patients with subfascial ports to a control group matched for gender, BMI and age. Each subject completed a questionnaire utilising a 1 to 10 scale for nine parameters related to comfort and cosmesis and two parameters related to discomfort during adjustments.
Results Sixty-eight patients with subfascial ports were identified and the overall response rate was 84%. The groups were well matched for gender (m:f ratio 1.8:1 vs. 1.7:1, p=1.000), age (51.0 vs. 49.6 years, p=0.528) and BMI (39.8 vs. 40.3 kg/m^2, p=0.585). There was no difference in port infection rates (0/68 vs. 1/68, p=1.000) but the subfascial group had more hernias (3/68 vs. 0/68, p=0.244). Subfascial patients experienced more pain during adjustments (score 4.3 vs. 2.6, p=0.047) but a combined analysis of cosmesis showed a slight positive trend (1.58 vs. 1.76, p=0.379).
Conclusion Both port locations are well tolerated. Subfascial placement is associated with more pain during adjustments but there is no difference in port infection or skin erosion rates.

Keywords Bariatric surgery · Obesity surgery · Subfascial · Access port · Gastric banding · Port complications · Port infection

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Introduction

In some bariatric patients with predominantly intra-abdominal fat, a relatively shallow subcutaneous fat layer separates the gastric band access port from the skin. Over the last 2 years we have been placing the access port underneath the right rectus muscle (subfascial) in these patients to avoid skin erosion after a period of weight loss and to improve cosmesis and tolerance of the foreign body.

Variations in access port placement are common between surgeons and include: on the anterior rectus sheath, under the sheath, within subcutaneous fat, sub-xiphoid and left subcostal margin [1]. Ports can be fixed or non-fixed.

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Reported complication rates specific to the access port system range from 5% to 13.5% and the reoperation rate related to port problems is usually between 5% and 10.2% ([2–5] and personal series of author). These problems, which include infection, tubing leaks, rotation, migration and port site hernia, delay weight loss causing frustration for the patient and surgeon. Port infection, reported at rates from 1.25% to 4.4% ([2, 4; and personal series of author]) is a particularly troublesome entity that usually responds only to surgical removal of the port [5]. Anecdotally we have noted that when ports are re-placed subfascially after prior infection they rarely become re-infected so we believe that this position may be relatively resistant to sepsis.

In addition to this when the subcutaneous fat layer thins with weight loss, the access port can become a source of discomfort or cosmetic concern. Some patients desire to conceal the fact that they have had a band, others play sports or undertake work-related activities where a prominent port may cause embarrassment or annoyance. There is very little published data looking at cosmetic outcomes and general tolerance of the access port. We consider this issue to be worthy of study, particularly given the female preponderance of bariatric clients in most clinics.

Materials and Methods

Operative Technique

Since January 2006 we have been using the low profile access port with the Velocity port applicator with the Swedish adjustable gastric band system. Our standard technique is to fix the port to the anterior rectus sheath with the port applicator after appropriate subcutaneous dissection.

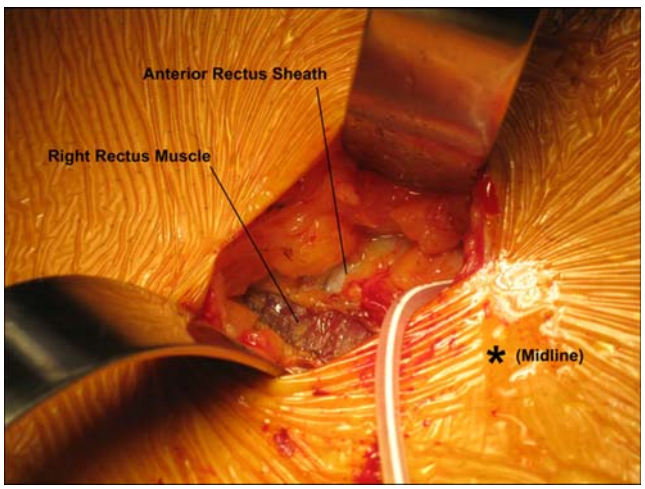

Fig. 1 Subfascial access port insertion: anterior sheath opened

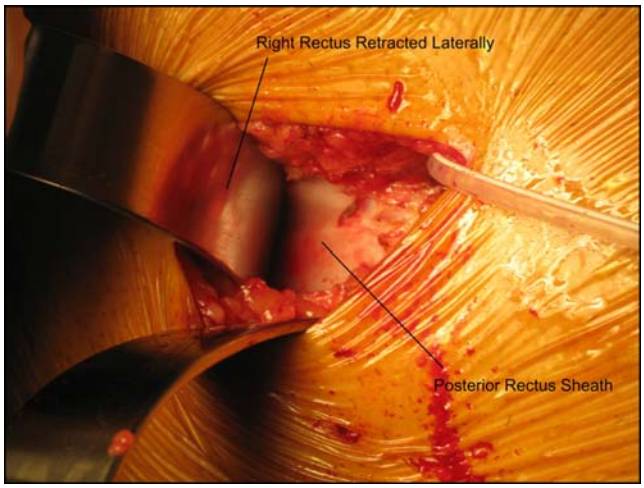

Fig. 2 Subfascial access port insertion: posterior sheath exposed

In selected patients with a particularly thin subcutaneous fat layer (usually <5 cm) we have been choosing to place the port by hand underneath the rectus muscle.

This subfascial port insertion technique is as follows:

After placement of the band, the tubing exits the abdominal cavity via our 15-mm port site placed approximately in the midline and about 12 cm below the xiphisternum. After some subcutaneous dissection, the fascia over the right rectus muscle is exposed. A transverse cut approximately 3 cm long is made with diathermy in the anterior rectus sheath from the midline laterally (Fig. 1). Once the right rectus muscle is clearly exposed, a curved retractor is inserted under the rectus muscle to retract it laterally and expose the posterior sheath. After connection to the tubing, the port is then placed under the muscle but on top of the posterior rectus sheath (Fig. 2) and pushed laterally with the index finger so that it is entirely covered by the muscle**.** The anterior sheath is then closed with a 1-vicryl continuous suture, leaving the tubing to exit next to the linea alba with the suture tied snugly around it. Once excess tubing is delivered back into the abdomen, the 15-mm port site is then closed with a 1-vicryl "figure of 8" leaving enough space for the tubing to pass from the

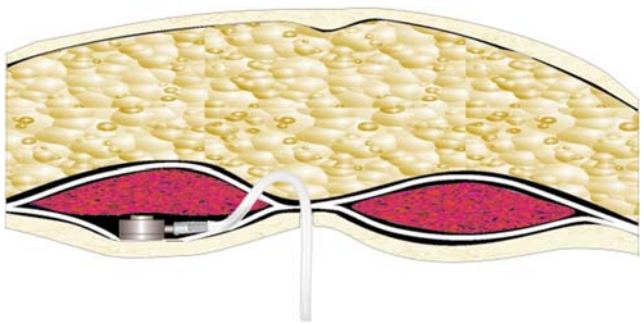

Fig. 3 Final port position in cross-section

Table 1 Baseline characteristics subfascial and control groups

Characteristic	Subfascial group	Control group	Significance[a]
Total number	68	68	
Mean age (years)	51.0	49.6	$p=0.528$
Mean weight (kg)	118.0	119.8	
Mean BMI (kg/m2)	39.8	40.3	$p=0.538$
Median follow-up (months)	8.4	12.7	$p<0.001$
Mean %EWL on follow-up	46.1%	51.3%	$p=0.777$
Mean No. Of adjustments	1.8	2.7	$p=0.006$[b]
Male:female ratio	1.8:1	1.7:1	$p=1.000$[c]

[a] Two-tailed *t* test for dependent variables

[b] Wilcoxon test for non-parametric dependent variables

[c] McNemar's test for dependent categorical variables

peritoneal cavity unimpeded. Figure 3 shows the final position of the port in cross-section.

Port adjustments are done in the clinic as a routine with a Huber needle without the aid of imaging. Difficult port adjustments are sent for adjustment under X-ray or ultrasound guidance.

Study Design

Clinic records, operative notes and the LapBase® database (Accessmed, Melbourne) were examined to find all patients who had had subfascially placed ports since January 2006 when the Velocity port had been in use routinely. We recorded demographic information including age, weight, BMI, time since band was placed and complications including infected wound, infected port, port site hernia, skin erosion from port, rotated port and other general operative complications. From the remaining patients (using the same port) with standard port placement we chose an identical number to represent a control group. These patients were matched to the subfascial group by gender, BMI, age and time since band or clinic attendance as closely as possible and in that order of priority. Gender was chosen as the most important comparative variable as this is in our opinion the most important factor determining subcutaneous fat layer thickness.

Questionnaires were sent out to each patient in both groups. A 1 to 10 scale was devised for nine parameters relating to comfort and cosmesis regarding the access port (details in Table 3). There were two questions relating to discomfort and difficulty in port access for adjustments (see Table 4). The scale was devised such that 1 represented best outcome for the patient and 10 the worst in each case. We also noted how many patients had been referred for radiologically guided adjustment from the clinic.

Complications were sourced from patient records and self-reported via the questionnaire. All patients failing to return questionnaires were called by phone to enhance follow-up rates. This investigator was blinded to the treatment and control group, as were most of the patients who were not routinely informed of port position.

Statistical Comparisons

Scaled parameters out of 10 were analysed and compared with the Wilcoxon test for dependent variables as they were not normally distributed. Categorical variables were compared using McNemar's test.

Results

The characteristics of the two groups are shown in Table 1.

Of the patients, 58/68 (85.3%) in the subfascial group completed questionnaires and 57/68 (83.8%) patients in the control group giving a total response rate of 84.6%.

Table 2 Complications

Complication	Subfascial group	Control group	Significance[a]
Major complications			
Band erosion	1/68	1/68	
Band slippage	0/68	1/68	
Port infections	0/68 (0.0%)	1/68 (1.5%)	1.000
Wound infections (port not involved)	1/68 (1.5%)	1/68 (1.5%)	
Port-related hernias	3/68 (4.4%)	0/68 (0.0%)	0.248
Port rotations	1/68 (1.5%)	1/68 (1.5%)	
Total re-operations related to port	3/68 (4.4%)	1/68 (1.5%)	0.617

[a] McNemar's test for dependent categorical variables

Table 3 Comfort and cosmesis results

Parameter	Subfascial port group[a]	Standard port group[a]	*p* value[b]	Significant?
Everyday discomfort and pain	1.6	1.7	0.841	N
Self-awareness of port	2.3	2.9	0.114	N
Others notice port	1.2	1.5	0.055	N
Port protrusion	1.6	2.2	0.236	N
Affects lying on stomach	2.0	1.8	0.433	N
Interferes with sex	1.2	1.2	0.715	N
Interferes with sport	1.4	1.5	0.169	N
Interferes with work	1.3	1.2	0.917	N
Overall cosmetic satisfaction	1.7	1.8	0.970	N

[a] Scores are mean scores out of 10 where 10 represents worst outcome for patient

[b] Wilcoxon test for matched pair variables

Comfort and Cosmesis

Out of nine parameters measuring subjective comfort and cosmesis related to the access port, none was significantly different between subfascial and control groups (see Table 2). All 16 mean response scores except one were less than 2.5/10.

Ease of Port Access

Table 3 shows three parameters looking at ease of port access by the medical practitioner. Port access was reported as easiest in the control group (mean score 4.3 vs. 2.6 for subfascial and control groups respectively, $p=0.046$) and less discomfort/pain during access was experienced by the control group (3.7 vs. 2.3, $p=0.012$). Twelve of 68 subfascial group patients were sent to XR at least once for adjustment under fluoroscopy versus 6/68 of the control group ($p=0.052$).

Complications

Major early or late band complications were uncommon in either group (see Table 4). There were no port infections or skin erosions in the subfascial group. Port rotations were uncommon (one in each group) but three subfascial patients had port-site-related hernias compared to zero in the control group (4.4% vs. 0.0%, $p=0.248$). This difference was non-significant.

Discussion

This is a controlled retrospective analysis using matched pairs to examine the differences between subfascial and suprafascial port fixation with regard to complications, comfort and cosmesis and ease of port access.

Subfascial and control groups are well matched for gender, BMI and age which were considered the most important factors to control for subjective outcomes. Length of follow-up was longer for the control group due to the fact that more ports have been placed subfascially in recent years. Despite this difference, BMI was similar in both groups at follow-up (subfascial 33.4 kg/m^2 vs. control 33.9 kg/m^2, $p=0.766$). Control group patients had more adjustments post-op than the subfascial group (mean 2.7 vs. 1.8, $p=0.007$) which represents the increased follow-up time for the controls.

Table 4 Ease of port access results

Parameter	Subfascial port group[a]	Standard port group[a]	*p* value	Significant?
Ease of port access for practitioner	4.3	2.6	0.046[b]	Y
Discomfort/pain during port access	3.7	2.3	0.012[b]	Y
No. sent to X-ray for adjustment	12/68	6/68	0.052[c]	N

[a] Mean scores out of 10 where 10 is the worst outcome for the patient

[b] Two-tailed *t* test for dependent variables

[c] McNemar test for dependent categorical variables

Access ports seem to be well tolerated by most patients regardless of position. In six out of nine categories related to comfort and cosmesis, the subfascial position was favoured although none of these differences was statistically significant. Discomfort during port access was worse in patients with subfascial ports, most likely due to the necessary penetration of the anterior sheath during needling. The port is also more difficult to palpate under the rectus muscle and may be positioned far more laterally than the overlying surgical scar. It was noted that non-surgeon practitioners often had particular difficulty adjusting subfascial ports.

We found more port-site-related hernias in the subfascial group although the difference was not statistically significant. This may be related to the need to incise the anterior sheath to place the port, creating an extra fascial weakness for the patient. No infections were seen in the subfascial group but the study was underpowered to compare infection rates despite including all our subfascial patients [6].

Unfortunately there is no definitive solution to the problem of port infection after gastric banding. We hypothesise that port infections may occur less frequently in the subfascial location due to its physical separation from the skin incision and from haematoma/seroma collections in the subcutaneous space but more numbers are needed to prove or disprove this contention. Separate to the issue of infection, the possibility of skin erosion or ulceration from the port in patients with thin adipose layers remains another key reason why we continue to selectively place ports under the muscle. This complication has been reported to occur in up to 4.5% of cases in one report [3]. It is notable that port migration or rotation did not increase despite the lack of fixation in the subfascial position.

Conclusion

Subfascial port placement is easy to achieve and may have a role in patients with a relatively thin subcutaneous fat layer. These patients do, however, experience increased discomfort and difficulty when their ports are accessed and there was no demonstrated improvement in cosmesis or day to day port tolerance compared to suprafascial fixation. No differences in port infection or skin erosion rates were observed although the study was underpowered for these outcomes. Port site hernias were more frequent in the subfascial group but the difference was statistically non-significant.

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Conflict of Interest None

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