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CASE REPORT

Epigastric hernia following DIEP flap breast reconstruction: Complication or coincidence?

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Summary Objective: Donor site hernias are a rare but well recognised complication of deep inferior epigastric perforator (DIEP) flap breast reconstruction but there are no reported cases of epigastric hernias after such surgery. We report three patients who developed symptomatic epigastric hernias within 2–8 months after discharge from follow-up.

Patients and methods: Patients who were referred to the Breast Plastic Surgery Clinic with symptomatic epigastric hernias following DIEP flap breast reconstruction were retrospectively reviewed. **Results:** The three patients were aged between 50 and 70 years. Their mean BMI was 29 and none were smokers or diabetic. The incidences of other predisposing factors were: previous abdominal surgery (1/3), heavy lifting (2/3) and multiparity (2/3). They were successfully treated laparoscopically (2) or by open technique (1) confirming the CT scan findings.

Discussion and conclusion: The aetiology of epigastric hernias is obscure in general. The association with DIEP flap harvest may be purely coincidental. However, it appears that abdominal flap harvest predisposed these patients to epigastric hernias. One or more of the following factors may have caused either weakness of the anterior abdominal wall or increased intraabdominal pressure:

- Short-term partial denervation of the rectus abdominis muscle
- Heavy lifting
- Previous surgery; obesity; multiple pregnancies
- Tight plication of the infraumbilical rectus sheath and muscle

This series of 3 symptomatic epigastric hernias following DIEP flap breast reconstruction is interesting as it documents donor site morbidity at a site distant from the exact site of flap harvest; this subject merits further detailed investigation.

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Introduction

Donor site complications following deep inferior epigastric (DIEP) flap breast reconstruction mostly relate to the infraumbilical flap harvest site. They include abdominal wall weakness, bulging, asymmetry, contour abnormalities and, rarely, frank herniation.^{1,2} Localised hernias have an incidence of around 0.7%.² There are no reported cases of hernias distant to the infraumbilical dissection site following DIEP flap harvest. In 2009, three DIEP flap patients who had been discharged from follow up were re-referred with symptomatic epigastric hernias, raising the question whether the epigastric hernias were a complication of their flap harvest or a coincidence and prompting a literature review and this case series report.

Case reports

Case 1. A 49-year-old woman underwent an uneventful left mastectomy, axillary clearance and immediate DIEP flap reconstruction in July 2008 (Figure 1a and b). She was para 4, had a BMI of 31.3 and her job involved some heavy lifting. Her past history included a grid-iron appendicectomy and laparoscopic sterilisation. She was re-referred in May 2009 with a small, tender, reducible hernia in the midline epigastrium composed of pre-peritoneal fat (Figure 1c) which was successfully repaired laparoscopically with mesh reinforcement.

Case 2. A 59-year-old woman (BMI 27) had a left mastectomy, axillary clearance and immediate DIEP flap reconstruction in January 2008. (Figure 2a). She was a retired aircraft engineer whose past history included a paramedian laparotomy, two Caesarean sections, an open hysterectomy (via a lower midline incision), and a Pfannenstiel incision for an ovarian cyst. (Figure 2a). Her 3 children had weighed between 9 and 12 pounds at birth. In July 2009 she presented with a reducible midline epigastric hernia (Figure 2b), measuring 3.8 cm on CT scan

(Figure 2c). She subsequently underwent successful laparoscopic hernia repair.

Case 3. A 64-year-old patient underwent an uneventful delayed right breast reconstruction with a DIEP flap in October 2008 (Figure 3a). She was the main carer for her ill mother, which involved a lot of heavy lifting in the period after her reconstructive surgery. She was para 1 and clinically overweight (BMI = 29.4). Two months after discharge from clinic she presented with a tender upper abdominal swelling. Examination confirmed a reducible, right-sided epigastric hernia (Figure 3b and Figure 4a) measuring 4 cm on MRI scan (Figure 4b); particularly odd as the donor flap had been based on the left deep inferior epigastric vessels. She underwent open repair of her hernia in August 2009 via an abdominoplasty approach. There has been no recurrence at 6 months follow up (Figure 4c).

Discussion

Epigastric hernias comprise only 1.6–3.6% of all hernias.³ They occur in the linea alba between the umbilicus and the xiphoid process, usually consisting of preperitoneal fat with no demonstrable or defined hernial sac.⁴ Historically there are three aetiological theories. Moschowitz, and more recently Lang et al,³ proposed that increased intra-abdominal tension coupled with the perforation of the linea alba by small vessels created epigastric hernias.

The second theory concerns intrinsic weakness in the structure of fascial fibres; Askar⁵ suggested that variation in patterns of distribution of the aponeurotic expansion of the abdominal wall muscles predisposes to midline epigastric hernias. However, not everyone with a physiological weakness develops a hernia, also epigastric hernias may occur lateral to the midline, such as was seen in Case 3.

It is also widely recognised that straining alone is a risk factor for epigastric hernias; for example, repeated pregnancy and heavy lifting. Patient 2 had been pregnant with large babies and her occupation required heavy lifting for

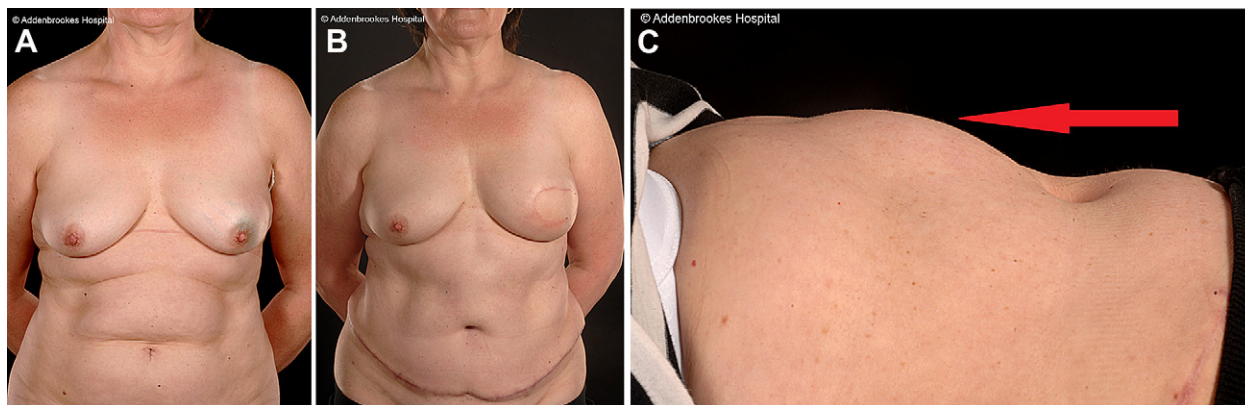


Figure 1 A. Ms A Appearance prior to mastectomy and DIEP flap reconstruction. Note the blue dye of the sentinel lymph node in the left breast. B. Ms A Post reconstruction appearances before development of hernia (patient declined the offer of a nipple reconstruction). C. Ms A Epigastric hernia – demonstrated by the patient lying supine on her back with legs raised.

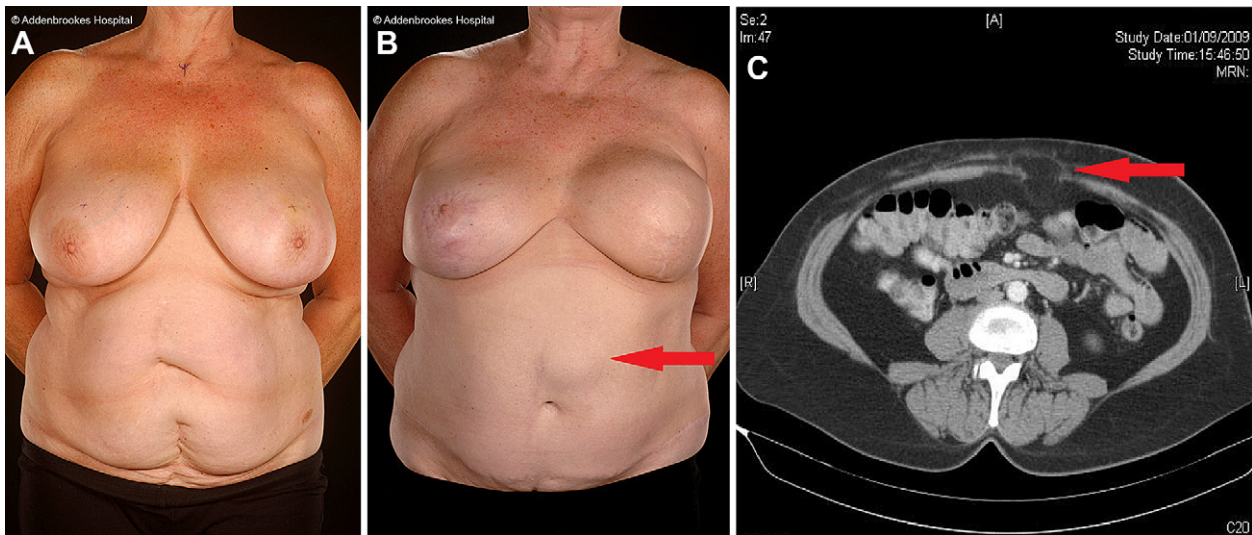


Figure 2 A. Ms B pre-reconstruction – please note the multiple abdominal scars. B. Ms B with an epigastric hernia just above the umbilicus and to the left of the paramedian scar. C. CT scan confirming epigastric hernia.

many years; Patient 3 admitted to repeated heavy lifting in the few months before hernia development. Patients 1 and 3 were both clinically obese, which is known to increase abdominal strain.

Chemotherapy is a known risk factor for DIEP flap donor site complications²; and the two immediate reconstruction patients had undergone adjuvant chemotherapy. A more likely risk factor for abdominal wall hernias, however, is previous surgery or preexisting scars. Parrett et al.⁶ found that 5.1% of patients with pre-existing scars developed abdominal wall laxity post-surgery, compared with only 2.2% of the controls. Patients 1 and 2 had had previous abdominal surgery before their reconstruction. Furthermore, patient 2 had a Pfannensteil scar – which reportedly gives a 6.7% risk of abdominal wall laxity.⁶ This, however, has not been the senior author’s experience⁶ as in his series

of 30 abdominal flap breast reconstructions pre-existing abdominal scars did not confer an increased risk of herniation.

Despite the rectus muscles and sheath being spared in the DIEP flap technique versus the TRAM flap,⁷ herniation at the donor site is still a recognised - although rare - complication, suggesting that the abdominal wall is still weakened in some way. Therefore it might be reasonable to propose any incisions in the abdominal wall may affect its mechanics as a whole, thus predisposing to hernias distant to the site of incision in the rectus sheath. Bottero et al.⁸ found that innervation of the rectus abdominis muscle dissected during DIEP flap procedures was significantly decreased in the following 15 months; perhaps this caused enough muscle weakness in our patients to predispose them to epigastric hernias.

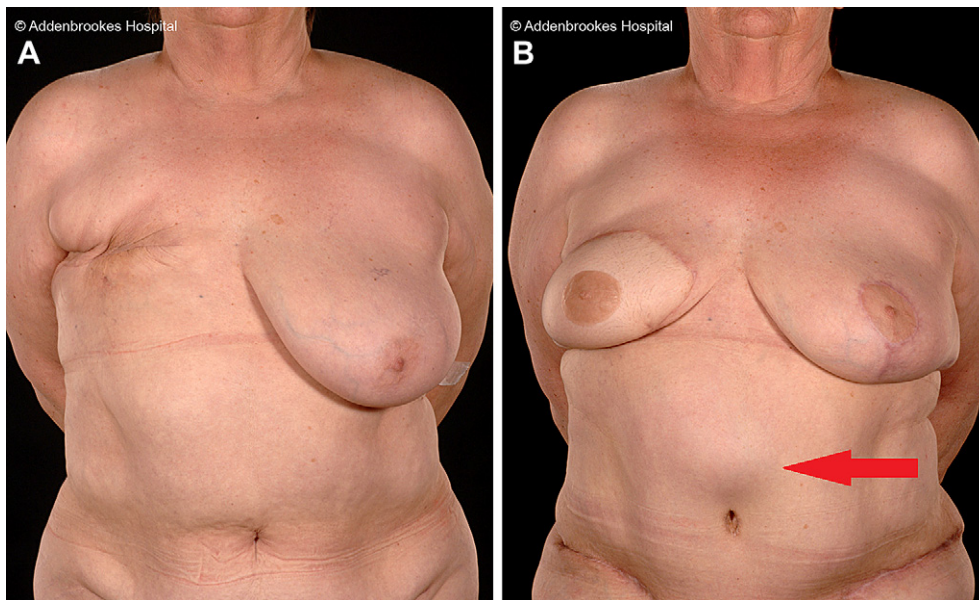


Figure 3 A. Ms C pre-reconstruction showing a high mastectomy scar and scarless abdomen. B. Ms C epigastric hernia (frontal view).

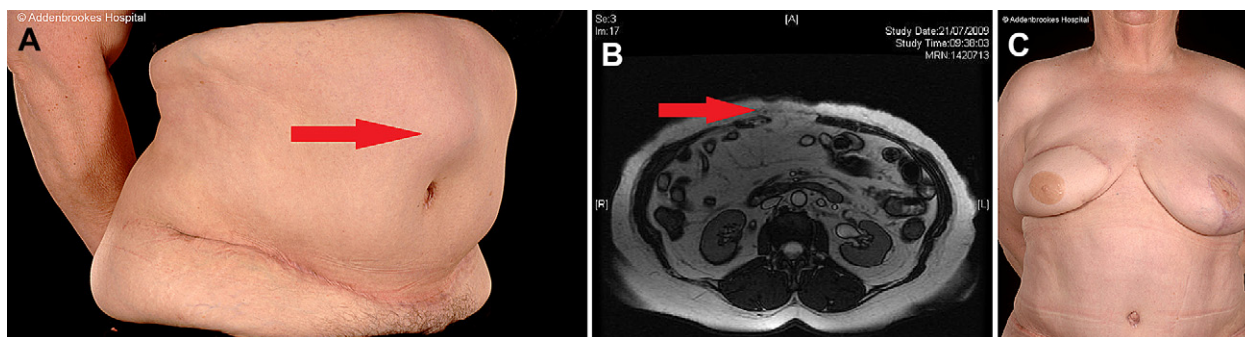


Figure 4 A. Ms C epigastric hernia (right oblique). B. Ms C MRI showing a large epigastric hernia. C. Ms C post-repair of the epigastric hernia.

Therefore, the possible mechanisms we propose for the formation of epigastric hernias in patients with DIEP flaps are in summary:

- Laxity of the abdominal wall caused by partial denervation of the rectus muscles, repeated pregnancy, and obesity
- Transmitted pressure on the upper abdomen caused by tight plication of the infraumbilical rectus sheath
- Weakening of the abdominal wall caused by previous surgery
- Increased intra-abdominal pressure caused by lifting

As all three patients had risk factors for the development of epigastric hernias it could be argued that their presentation months after their DIEP flap harvest was merely coincidental. However, although epigastric hernias are uncommon its proposed risk factors are common to many women, implicating the DIEP flap harvest as a predisposing factor. Specifically partial denervation of the rectus muscle by the lateral dissection⁹ can lead to anterior abdominal wall laxity but this would be localised to the potentially denervated area, that is, well below the umbilicus, but none of these hernias were located here. A more likely cause therefore is increased intra-abdominal pressure following the procedure; tight closure of the lower abdominal incision in the rectus abdominis muscle and sheath transmits an increase in pressure to the upper abdomen - which often remains un-plicated as this is unnecessary. A preexisting weakness (congenital or caused by pregnancy or heavy lifting) in the linea alba fascial structure may thus cause an epigastric hernia. Another possible mechanism is previous surgery as scar tissue in the anterior abdominal wall/sheath may have become stretched and weakened with pregnancies and the heavy lifting. This may act in combination with the first mechanism. Alternatively, these epigastric hernias may have been present all along and DIEP flap harvest merely altered the abdominal contour, making them symptomatic - hence the presentation.

Our report raises a number of questions. It would be interesting to look at the overall incidence of epigastric hernias (symptomatic or not) after DIEP flaps in a larger group of patients. These were the only three cases out of 113 patients receiving DIEP flap breast reconstructions performed by a single surgeon in preceding five years (January 2005–December 2009), and also after other forms of abdominal surgery. It is also unclear what the incidence

of asymptomatic epigastric hernias is. A larger study may help to distinguish whether epigastric hernias are a complication of DIEP flap reconstruction, or whether they were merely coincidental. It may also shed some light on the aetiology of epigastric hernias in general.

Conclusion

An interesting series of three symptomatic hernias following DIEP flap breast reconstruction is presented. It is noteworthy that it documents donor site morbidity at a site distant from that of the direct flap harvest/dissection. It also raises the question as to whether their occurrence was a coincidence or consequence of flap dissection or donor site closure. The aetiology is likely to be multifactorial and further investigation is required.

Ethical approval

None.

Funding

None.

Conflicts of interest

None.

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