CASE REPORT

Reduction en masse of inguinal hernia: a review of a rare and potential fatal complication following reduction of inguinal hernia

Ashanga Yatawatta

Department of Surgery,
University of Texas Medical
Branch at Galveston, Galveston,
Texas, USA

Correspondence to
Dr Ashanga Yatawatta,
ayatawatta@gmail.com

Accepted 30 July 2017

SUMMARY

Reduction en masse is reduction of a hernial sac into the pre-peritoneal space with a loop of bowel remaining incarcerated at the neck of the sac, leading to early strangulation. This is a rare complication, usually encountered with inguinal hernias, with a false reassurance to the patient and the treating physician that complete reduction has been achieved. Unless early intervention is carried out, this condition will typically present with worsening pain and absence of an appreciable hernia bulge at the groin, and intestinal necrosis may be encountered on exploration. The outcome will depend on the severity of peritonitis/sepsis, and mortality remains high for late presentations. A case of early presentation of reduction en masse of an inguinal hernia is reported with a review of the existing literature.

BACKGROUND

Inguinal hernia is common, and complications are not often encountered provided treatment is sought in a timely manner. However, reduction at the bedside with various techniques of taxis may not be benign as the rare complication of reduction en masse may ensue. This condition needs astute clinical judgement and close monitoring to avoid strangulation and peritonitis, which is not possible if the patient is discharged immediately after the procedure. A case is presented which highlights the importance of recognition and prevention of this complication and the currently available treatment is reviewed.

CASE PRESENTATION

A 55-year-old man was admitted with persistent pain over the lower abdominal region 12 hours after self-reduction of a right inguinal hernia. The patient had been aware of the hernia for 15 years and it had been self-reduced by the patient on multiple occasions. However, it had not been evaluated by a surgeon in the past until the index admission.

Clinical evaluation at the time of admission was consistent with localised peritonitis not amounting to generalised peritonitis. Due to lack of clarity on the clinical diagnosis, CT abdomen was performed.

Clinical suspicion of reduction en masse of an inguinal hernia was confirmed by CT (figures 1, 2 and 3) and emergency surgery was offered. Palpation of the abdomen after induction of anaesthesia revealed a firm globular structure arising from the right inguinal region. It was not possible to palpate below the lesion, indicating extension to the inguinal canal.

A lower midline laparotomy was performed. A reduction en masse of the right inguinal hernia was noted (figure 4), which was reduced to reveal strangulated ileum of 10 cm (figure 5). Resection and end-to-end anastomosis was performed. The patulous internal inguinal ring was noted and this was approximated with interrupted absorbable sutures.

OUTCOME AND FOLLOW-UP

The patient made an uneventful recovery. He was discharged on postoperative day 5 and was followed up in the clinic with no recurrence of hernia and planned for hernia repair via a groin incision in a few months.

DISCUSSION

Inguinal hernia is one of the the most common conditions encountered by general surgeons and emergency presentation, although not uncommon, is usually due to incarceration or intestinal obstruction. Strangulation is typically a result of late presentation.

Emergency presentation with symptoms or incarceration is commonly treated by manual reduction with a varying degree of force and additional manoeuvres such as Trendelenberg position, sedatives and muscle relaxants and customised taxis

Figure 1 Cross-section of the right inguinal region with the hernia sac.

To cite: Yatawatta A. *BMJ Case Rep* Published Online First: [please include Day Month Year]. doi:10.1136/bcr-2017-220475

Figure 2 Sagittal section showing the hernia sac partly within the inguinal canal.

techniques depending on the operator. These produce satisfactory results in most cases, but later presentation with reduction en masse may be encountered by a different team of physicians and may not be recognised as a complication from the previous reduction.

The first report of reduction en masse was by Luke in 1843,¹ and Pearse estimated an incidence of 1 in 13 000 cases.² It may be rare and under-reported, but it has been more widely recognised since 2008 as the pathophysiology is now better recognised.^{3–5}

Reduction en masse typically occurs on a chronically reducible inguinal hernia, with reduction becoming increasingly difficult due to the presence of fibrosis after repeated reduction. A history of increasingly more difficult reductions is present in almost all cases. Ultimately, the hernial sac with contents not reduced will find the path of least resistance with the pressure generated at reduction to create a space in the pre-peritoneal space. The trauma at reduction will likely cause mucosal oedema and progression to strangulation will occur at an expedited pace.

In the setting of strangulation and peritonitis, the outcome is poor with profound sepsis leading to organ failure and death unless timely intervention is carried out.

Figure 3 Coronal section showing a loop of bowel within the hernia sac adjacent to the femoral artery.

Clinical evaluation is unlikely to be diagnostic, but the recent difficult reduction of a hernia with a long-standing history will be a crucial clue. Patients will likely have localised peritonitis over the lower abdominal region with no evidence of a hernia on the groin if presenting early, or generalised peritonitis if presenting later. Deep palpation, if permitted due to pain, will likely reveal the presence of a firm globular tense structure arising from the

Figure 4 Widely patent internal inguinal ring; the tips of the forceps are within the dilated internal ring.

Figure 5 Loop of distal small bowel after reduction from the hernia sac.

groin and inability to get below the lump. Clinical examination after induction of anaesthesia will be the best time to elicit these clinical findings.

CT will likely reveal the 'preperitoneal hernia sac sign', which is the presence of a hernia sac in the preperitoneal space (not in the inguinal or femoral canals) containing a bowel loop which may be obstructed or incarcerated with the presence of small bowel obstruction.⁶ Other modalities such as ultrasound scanning have not been widely described for confirmation of the diagnosis.

The place of laparoscopy in diagnosis and treatment has been increasingly reported in the literature but operator experience is important, especially for treatment, which involves proper reduction, inspection and resection of non-viable bowel and closure of the hernia sac from within or laparoscopic hernia repair (TAPP), if indicated. This would be expected to be the procedure of choice in the future in patients stable enough to undergo a laparoscopic procedure.⁷⁻¹¹

Reduction en masse is typically described for indirect inguinal hernias, possibly due to the presence of a narrow neck leading to fibrosis with repeated manipulation and likelihood of strangulation. Direct inguinal hernias, with a wider neck and shorter/direct course to the peritoneal cavity, will likely result in less risk for reduction en masse and this has not been widely reported. Femoral hernias are at high risk for reduction en masse due to the narrow neck but, because of the high risk of strangulation associated with their natural history, they are likely to undergo emergency/early intervention and will not be subjected to repeated reduction and observation. A first presentation of a femoral hernia can be reduced into the pre-peritoneal space and undergo surgery shortly afterwards, thus limiting the risk of strangulation which typically takes around 12 hours, as described in our case.

Ravikumar *et al* described three pre-conditions for a reduction en masse to occur: a relatively lax deep inguinal ring, a narrow and fibrous neck of the hernia and space for the pre-peritoneal sac.⁶ This is compatible with the pathophysiology describing the presence of fibrosis from repeated reduction. We also believe that overenthusiastic attempts at reduction with various types of taxis are more likely to create a pre-peritoneal space, which is a potential space used for laparoscopic hernia repairs present in everyone. The lax deep inguinal ring is likely to be dynamic as it would prevent reduction leading to

multiple episodes of incarceration. Sedation and muscle relaxation would likely result in a short period of laxity of the deep inguinal ring as the fibrotic neck of the sac is unaffected, with the taxis allowing the descent of the hernia along the path of least resistance. If the deep ring is not lax, taxis will likely result in perforation of the bowel within the non-reduced hernial sac, with a diagnosis likely to be clinically apparent. Therefore, the presence of a sufficiently lax deep ring will lead to recurrent episodes of incarceration not amounting to strangulation, and allow reduction with increasing difficulty. The patulous internal ring in our case as well as other reported cases indicates possible dysfunction of the structure or function of the normal mechanisms allowing the maintenance of competence of the deep inguinal ring. This will need to be further studied to determine a possible predisposition to reduction en masse.

Treatment of reduction en masse depends on the viability of the reduced loop of bowel. Strangulation requires a resection and anastomosis and obviously viable bowel can be reduced with no additional interventions. Marginally viable bowel can be observed after reduction and, once the perfusion is declared, decision-making should be clear. In the presence of uncertainty, it is better to resect to avoid late ischaemic necrosis or healing with stricture.

The other key decision is the management of the deep inguinal ring. In the presence of bowel necrosis, prosthetic mesh or anatomical repair from a groin approach will be associated with a high risk of infection and recurrence. In the absence of bowel necrosis, once the hernia is reduced, primary hernia repair with mesh is recommended. If the exposure was laparoscopic a TAPP type repair has been described and, if a contralateral or femoral hernia is noted, it can be treated at the same setting. If the exposure was laparotomy, either an open TAPP type repair or a groin incision/mesh placement can be performed depending on the experience of the operator.

Early recognition is the key factor leading to a better prognosis and a high clinical suspicion has to be maintained, especially after an exceptionally difficult reduction of a long-standing hernia. Contrary to common practice, overnight observation will minimise missing a late presentation and early repair of the hernia is strongly encouraged, even in the absence of deterioration of clinical findings after reduction.

Learning points

- ▶ Reduction of hernia at the bedside should always be followed by observation overnight
- ▶ Aggressive attempts at reduction of irreducible/incarcerated hernias should be avoided and surgical exploration should be offered instead
- ▶ Reduction en masse should be in the differential following reduction of inguinal hernia and early intervention is strongly recommended

Contributors AY was responsible for the concept, design and writing the manuscript.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

© BMJ Publishing Group Ltd (unless otherwise stated in the text of the article) 2017. All rights reserved. No commercial use is permitted unless otherwise expressly granted.

REFERENCES

- 1 Luke J. Cases of strangulated hernia reduced "en masse," with observations. *Med Chir Trans* 1843;26:159–87.
- 2 Pearse HE. Strangulated hernia reduced en-masse. *Surg Gynecol Obstet* 1931;53:822–8.
- 3 Watanobe I, Yoshida N, Watanabe S, *et al*. Late-onset bowel strangulation due to reduction en masse of inguinal hernia. *Case Rep Surg* 2014;2014:1–4.
- 4 Wright RN, Arensman RM, Coughlin TR, *et al*. Hernia reduction en masse. *Am Surg* 1977;43:627–30.
- 5 Corner EM, Howitt AB. VII. The reduction en masse of strangulated and non-strangulated herniae. *Ann Surg* 1908;47:573–87.
- 6 Ravikumar H, Babu S, Govindrajan M, *et al*. Reduction en-masse of inguinal hernia with strangulated obstruction. *Biomed Imaging Interv J* 2009;5:14.
- 7 Hoshino A, Kawachi Y, Takamatsu S, *et al*. Reduction en masse can be treated using pure laparoscopic transabdominal preperitoneal hernioplasty following early CT diagnosis: report of a case. *J Surg Case Rep* 2015;2015:rjv055.
- 8 Sahoo MR, *et al*. Laparoscopic management of reduction en-masse. *BMJ Case Rep* 2012;20:2012.
- 9 Altaf N, Ahmed J, Doran J. Laparoscopic assessment of bowel viability after reduction en masse. *Ann R Coll Surg Engl* 2006;88:316–22.
- 10 Kaiwa Y, Namiki K, Matsumoto H, *et al*. Laparoscopic relief of reduction en masse of incarcerated inguinal hernia. *Surg Endosc* 2003;17:352.
- 11 Wu CC, Kang JC, Huang YM. Laparoscopic transabdominal preperitoneal hernioplasty for reduction en masse of an incarcerated inguinal hernia: a case report. *J Gastrointest Surg* 2012;16:1433–5.

Copyright 2017 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- Submit as many cases as you like
- Enjoy fast sympathetic peer review and rapid publication of accepted articles
- Access all the published articles
- Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow