CASE REPORT

Bilateral otorrhagia: a rare complication of laparoscopic abdominopelvic surgery

Alfred Bentsi Addison,¹ Esther Inarra,² Simon Watts³¹Department of Otolaryngology, Brighton and Sussex University Hospital, Brighton, UK²Department of ENT, Brighton and Sussex University Hospital, Brighton, UK³Brighton and Sussex University Hospital, Brighton, UK**Correspondence to**Dr Alfred Bentsi Addison, alfred.addison@nhs.net

Accepted 9 November 2014

SUMMARY

An 80-year-old woman without any previous otological symptoms underwent laparoscopic abdominoperineal resection for T3N0M0 low rectal carcinoma 4–5 cm from the anal verge. The total operative time was 6 h, of which she spent long hours in the Trendelenburg (35°) position due to difficult pelvic dissection. Midway through the procedure, she developed spontaneous non-traumatic bilateral otorrhagia. This case highlights the potential risk of increased intracranial pressure during prolonged periods of being in a steep Trendelenburg position caused either by the position itself or in combination with carbon dioxide pneumoperitoneum. We also consider the effect of a sudden change from this position to supine as a potential risk.

BACKGROUND**Physiological effects of steep Trendelenburg position**

Most studies investigating the physiological effects of the Trendelenburg position have found a significant increase in mean arterial blood pressure (BP; >25%) and systemic vascular resistance (>20%) associated with a steep Trendelenburg tilt greater than 30°, when combined with carbon dioxide pneumoperitoneum.^{1–3} These changes are generally understood to be due to increased intra-abdominal pressure compressing the abdominal aorta and therefore increasing systemic vascular resistance and afterload. This together with the enhancing effects of humoral factors plays an important role in raising intrathoracic and intracranial pressures.

The physiological effects of the steep Trendelenburg position on parameters such as heart rate (HR), stroke volume (SV) and cardiac output (CO) have not been adequately studied. Current available evidence is based on a handful of retrospective and prospective data; the outcomes of these studies have not been consistent, while some studies such as by Park *et al*⁴ reported no change in these parameters, other studies such as Kalmar *et al*⁵ reported decrease in HR, SV and CO associated with steep Trendelenburg position.

The effects of steep Trendelenburg on the vasculature of the head, neck and thorax have also been poorly studied. The current evidence,^{6–7} however, suggests that the steep Trendelenburg position together with pneumoperitoneum increases intrathoracic and intracerebral venous congestion leading to raised intracranial pressure. Indeed, there have been several case reports on facial, pharyngeal and laryngeal oedema, confusion and

ischaemic optic neuropathy following procedures where patients have had to be placed in the Trendelenburg position for long periods. These complications have been attributed to obstructive reduction in venous outflow due to pneumoperitoneum and steep Trendelenburg position. It has been postulated in the case of ischaemic optic neuropathy that the elevated venous pressure in the head and neck from this position leads to venous congestion, which causes interstitial fluid accumulation from a capillary leak hence decreased perfusion of the optic nerve. This effect combined with the venous infarction due to reduced venous outflow and/or direct mechanical damage due to elevated interstitial pressure is believed to be the main culprits.⁸ This has led to the call for long periods of steep Trendelenburg position to be avoided and a restriction in the use of intravenous fluids.^{9–10}

Spontaneous vessel bleed

Spontaneous vessel haemorrhage is a well-known phenomenon accounting for haemorrhagic strokes and other vascular injuries. This is usually due to atherosclerotic vessels that spontaneously rupture and cause infarction.¹¹ Spontaneous venous haemorrhages have been reported in patients with venous thrombosis and/or venous malformations. Animal studies and a few case reports have suggested that increase in venous pressure exceeding the capacitance of the vessel can lead to direct injury to the vein and hence haemorrhagic infarction.¹¹ The possibility of transcapillary bleed due to increased central venous pressure and arterial pressure against the background of venous congestion may also be the reason for spontaneous haemorrhage.¹²

CASE PRESENTATION

An 80-year-old woman (American Society of Anaesthesia, ASA grade 3) with a history of hypertension, low rectal carcinoma and no prior otological symptoms was admitted for elective laparoscopic abdominoperineal resection. Despite her history, she is a reasonably well individual who takes lisinopril (5 mg) and atenolol (10 mg). She is a non-smoker, able to independently perform all activities of daily living and is the main carer for her unwell husband.

Initial investigation and staging revealed a T3N0M0 tumour and the patient went on to have neoadjuvant chemotherapy with oxaliplatin and capecitabine. The patient responded very well to chemoradiotherapy, such that the synchronous

CrossMark

To cite: Addison AB, Inarra E, Watts S. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2014-206118

sigmoid and rectal tumour, which was extending into the mesorectal fat and the circumferential resection margin on the pre-treatment MRI, had significantly resolved with near complete resolution of the sigmoid to a lobulated T2 mass, with only residual mucosal thickening but no obvious tumour by the end of chemoradiotherapy treatment.

The decision was made for the patient to be admitted for laparoscopic abdominoperineal resection. She was admitted pre-operatively for preoperative drinks and monitoring. Her preoperative observations were as follows: BP 154/78 mmHg, HR 74, respiratory rate 22 and saturations of 100%.

Propofol, ketamin and pethidine were used during anaesthetic induction and rocuronium for muscle relaxation. Anaesthesia was maintained with rocuronium and nitric oxide.

The patient's systolic BP was maintained between 90 and 170 throughout the procedure; the total operative time was 6 h. About 45 min into the procedure, the patient was tilted into a steep Trendelenburg position to aid pelvic dissection. She was then tilted back to Tsupine position after 2 h of steep Trendelenburg position. Half an hour following return to supine position she was noted to have spontaneous bilateral otorrhagia. Her pupils were equal and reactive to light and no focal neurological signs were present. Of note was her systolic BP, which remained between 130 and 170 during the steep Trendelenburg position, 90–130 following return to the supine position and 110/50 at the time of bilateral otorrhagia.

The patient went on to have an urgent ear, nose and throat review at which point she was found to have haematoma in both external auditory canals. Assessment of the ear canals after evacuating the haematoma revealed a sloughed off outer squamous layer of the tympanic membrane, which was actively bleeding bilaterally. Both ears were packed with epinephrine soaked cotton for 5 min, followed by insertion of bismuth iodoform paraffin phosphate (BIPP) impregnated gauze into the external auditory canal.

The procedure was then successfully completed and the patient awoke from the anaesthesia without any localising or lateralising neurological signs. She had an episode of post-operative confusion, which subsequently improved.

She was reassessed after 48 h and the BIPP was removed; there was no further bleeding, she remained neurologically intact with a Glasgow Coma Scale of 15/15 and the team felt there was no indication for MRI or CT. She continued to make good progress and was discharged home 9 days postsurgery. She is currently doing well and has no problems with regard to hearing.

DISCUSSION

We believe a combination of the pneumoperitoneum associated with the significant period of being in a steep Trendelenburg position led to increased intrathoracic cephalic and intracranial pressures resulting in venous congestion and subsequent vascular and tissue injury. We also hypothesise that a change in position from a steep Trendelenburg position to supine with a resultant sudden increase in venous return may have led to turbulent flow and potential haemorrhage. Although this area needs further

research, it is, however, important that the risk of the head being down for a prolonged period of time and its potential dangers are carefully weighed and precautions (intravenous fluid management, shorter periods in the Trendelenburg position and a gradual change in position) are taken to prevent harm to patients.

Learning points

- ▶ Otorrhagia is a rare complication of laparoscopic surgery. A PubMed search only reveals two case reports.
- ▶ There have been several reports on the adverse effects of long periods of Trendelenburg positioning and pneumoperitoneum on surgical outcomes due to intracranial and intrathoracic pressure.
- ▶ This case highlights a rare risk of otorrhagia associated with being in a prolonged Trendelenburg position and pneumoperitoneum.
- ▶ A possible pathophysiology and therefore possible management was evaluated.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Koliopoulos A, Zografos G, Skiathitis S, *et al.* Esophageal Doppler (ODM II) improves intraoperative haemodynamic monitoring during laparoscopic surgery. *Surg Laparosc Endosc Percutan Tech* 2005;15:332–8.
- 2 Myre K, Buanes T, Smith G, *et al.* Simultaneous haemodynamic and echocardiographic changes during abdominal gas insufflation. *Surg Laparosc Endosc* 1997;7:415–19.
- 3 O'Leary E, Hubbard K, Tormey W, *et al.* Laparoscopic cholecystectomy: haemodynamic and neuroendocrine responses after CO₂ pneumoperitoneum and changes in position. *Br J Anaesth* 1996;76:6404.
- 4 Park EY, Koo BN, Min KT, *et al.* The effect of pneumoperitoneum in the steep Trendelenburg position on cerebral oxygenation. *Acta Anaesthesiol Scand* 2009;53:895–9.
- 5 Kalmar AF, Foubert L, Hendrickx JF, *et al.* Influence of steep Trendelenburg position and CO₂ pneumoperitoneum on cardiovascular, cerebrovascular, and respiratory homeostasis during robotic prostatectomy. *Br J Anaesth* 2010;104:433–9.
- 6 Harris SN, Ballantyne GH, Luther M, *et al.* Alterations of cardiovascular performance during laparoscopic colectomy: a combined haemodynamic and echocardiographic analysis. *Anesth Analg* 1996;83:482–7.
- 7 Haxby EJ, Gray MR, Rodriguez C, *et al.* Assessment of cardiovascular changes during laparoscopic hernia repair using oesophageal Doppler. *Br J Anaesth* 1997;78:515–19.
- 8 Casati A, Comotti L, Tommasino C, *et al.* Effects of pneumoperitoneum and reverse Trendelenburg position on cardiopulmonary function in morbidly obese patients receiving laparoscopic gastric banding. *Eur J Anaesthesiol* 2000;17:300–5.
- 9 Lovell AT, Marshall AC, Elwell CE, *et al.* Intra-cerebral volume with changes in position in awake and anesthetized subjects. *Anesth Analg* 2000;90:372–6.
- 10 Merten CL, Knilenius HO, Hedde JP, *et al.* Intracerebral haemorrhage from a venous angioma following thrombosis of a draining vein. *Neuroradiology* 1998;4:15–18.
- 11 Tanaka Y, Furuse M, Iwasa H, *et al.* Lobar intracerebral hemorrhage: etiology and a long-term follow-up study of 32 patients. *Stroke* 1986;17:51–7.
- 12 Van Lieshout JJ, Wieling W, Karemaker JM, *et al.* Syncope, cerebral perfusion, and oxygenation. *J Appl Physiol* 2003;94:833–48.

Copyright 2014 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