

Letter to the Editor

Intra-aortic balloon pump for oesophageal dilatation

Rizwan A. Qureshi, Richard G. Berrisford*

Department of Thoracic Surgery, Royal Devon and Exeter Healthcare NHS Trust, Exeter, Devon, UK

Received 8 February 2002; accepted 22 March 2002

Keywords: Oesophageal stricture; Oesophageal dilatation; Intra-aortic balloon pump

We read with interest the article by Loubani et al. [1] regarding the use of intra-aortic balloon pumps (IABP) for dilating oesophageal strictures.

There are fundamental reasons why IABP is not the instrument of choice for oesophageal dilatation, even in difficult cases. IABP was never designed as a dilator. Its function is to produce diastolic augmentation of coronary and systemic blood flow by using the principle of diastolic counterpulsation. The balloon in the IABP is not calibrated to produce a given diameter for a known pressure; therefore the effect of inflating the IABP on a stricture is unknown. The user of an IABP in this situation does not know what diameter he/she is dilating to. We appreciate that inflation pressure is started in these case reports at a low value. The authors do not quote either a maximum inflation pressure or a maximum inflation diameter.

The authors mention a pressure-limiter within the system, which they call a 'feedback mechanism'. In fact the operator has no feedback about the resistance encountered by the balloon other than an alarm which sounds when a (randomly) set pressure has been reached. There has been no mention of any pressure in the article but the mean pressure to rupture the normal oesophagus is approximately 258 mmHg [2]. The pressure required to dilate peptic strictures vary enormously between 25 and 830 mmHg [3], so how does the operator know what to set as maximum?

The IABP catheter is at least four times the cost of a conventional balloon dilator, without considering the cost or availability of the pumping system. The IABP is too large to be passed through a fiberoptic endoscope channel, so the authors have used rigid oesophagoscopy in these patients with the higher risk of perforation which this carries [4]. The use of IABP for oesophageal dilatation is not covered by the manufacturer's warranty.

The mechanism behind oesophageal stricture dilatation is to apply a sufficient force to split the encasing fibrotic tissue in the submucosa and muscularis, allowing expansion of the oesophageal lumen, while maintaining mucosal integrity [5].

In contrast to the IABP, oesophageal balloon dilators such as controlled radial expansion (CRE) balloon (Microvasive Boston Scientific Corporation) have been designed for the

purpose of applying a controlled radial disrupting force. Importantly, the operator knows exactly what diameter the balloon has reached for a given applied pressure so that dilatation can stop when a sufficient size lumen has been reached.

The CRE balloon can be deployed through a 2.8 mm working channel of a conventional fiberoptic endoscope, avoiding the need for both general anaesthesia and rigid oesophagoscopy, lowering the potential for iatrogenic perforation. The cost is much less than an IABP, and an inexpensive handheld pressure gun is the only pressure generator needed. This system gives the operator true 'feedback' as he/she can move the balloon within the stricture at gradually increasing diameters and assess the tightness of grip before dilating further. We do not believe the use of IABP is warranted in treating oesophageal strictures.

References

- [1] Loubani M, Chetty G, Shawkat S, Leverment JN. Oesophageal strictures: new indication for intra-aortic balloon pumps. *Eur J Cardiothorac Surg* 2001;20:1237–1239.
- [2] Burt CA. Pneumatic rupture of the intestinal canal with experimental data showing mechanism of perforation and the pressure required. *Arch Surg* 1931;22:875.
- [3] Kozark RA, Phelps JE, Paryka EK, Sanowski RA. Intraluminal pressure generated during esophageal bouginage. *Gastroenterology* 1981;81:833.
- [4] Jones WG, Ginsberg R. Esophageal perforation: a continuing challenge. *Ann Thorac Surg* 1992;53:534.
- [5] Rice TW. Dilatation of peptic strictures. In: Pearson FG, Deslauriers J, Ginsberg RJ, Hiebert CA, McKneally FM, Urschel Jr HC, editors. *Esophageal surgery*, New York, NY: Churchill Livingstone, 1995. pp. 293–303.

* Corresponding author. Tel.: +44-1392-402689; fax: +44-1392-402175.
E-mail address: richard.berrisford@rdehc-tr.swest.nhs.uk (R.G. Berrisford)

PII: S1010-7940(02)00200-2

Reply to the Letter to the Editor**Reply to Berrisford**

Mahmoud Loubani*, Govind Chetty, Said Shawkat,
Joeseeph N. Leverment
*Department of Cardiothoracic Surgery, Glenfield Hospital,
Leicester, LE3 9QP, UK*

Received 11 March 2002; accepted 22 March 2002

Thank you for giving us the opportunity to respond to the letter from Berrisford et al. and to answer the points raised.

We elected to use the intra-aortic balloon pump (IABP) in the reported patients [1] as a last resort in order to avoid the need for major surgical intervention. However, the success of this technique in dilating the oesophageal strictures

combined with no morbidity or mortality, although admittedly in a small series, is certainly encouraging.

The pressure inside the balloon rises to a maximum of 300 mmHg (information supplied by Datascope) which is well within the pressure required to rupture a normal oesophagus [2] not that we are using the IABP in patients with normal oesophaguses. At that pressure, the pump alarms and the balloon stops inflating which acts as the safety mechanism we referred to in the original article [1]. Furthermore the pressure inside the balloon can be continuously measured by connecting a three way tap in the middle of the helium line and a manometer line from that point to a pressure transducer that will give a digital read out of the pressure inside the balloon as it inflates and deflates.

The electronically built in feed back mechanism allows a gradual increase in the pressure applied inside the balloon as the augmentation is increased. The application of hand held gauges are not any more sensitive and much more variable depending on the operator.

The fact that the authors obviously work in a stand alone thoracic surgery department rather than a combined cardiothoracic unit should not be used as a barrier to the use of IABP. Most units have both cardiac and thoracic surgery and therefore the balloon pumps are readily available. The cost of the balloons should be weighed against the complexity and increased risk of perforation in these selected patients if ordinary methods are used. Certainly not all units find this prohibitive.

The rigid oesophagoscope was used in our technique, as a port only and therefore added no extra risk of perforation. It was used to allow the introduction of the flexible oesophagoscope, the balloon and the contrast media. Another precaution in our technique is the use of screening during the procedure to confirm the position of the balloon prior to inflation and also to assess the success of the dilatation and integrity of the oesophagus at the end of the procedure.

The repeated dilatation with the rapid inflation and deflation of the balloon might be another advantage of this method resulting in the gradual dilation of the stricture. This might be a better approach for dilating the oesophagus rather than the sustained once off pressure from controlled radial expansion balloons.

We do not agree with Berrisford et al. and believe that the use of IABP should be considered as a viable option for the management of complex oesophageal strictures in the armamentarium of the Cardiothoracic Surgeon.

References

- [1] Loubani M, Chetty G, Shawkat S, Leverment JN. Oesophageal strictures: new indication for intra-aortic balloon pumps. *Eur J Cardiothorac Surg* 2001;20:1237–1239.
- [2] Burt CA. Pneumatic rupture of the intestinal canal with experimental data showing mechanism of perforation and pressure required. *Arch Surg* 1931;22:875.

* Corresponding author. Tel.: +44-116-2871-471; fax: +44-116-2502 449.

E-mail address: mahmoud.loubani@ntlworld.com (M. Loubani).

PII: S1010-7940(02)00199-9

Letter to the Editor

Re: Fistula of the internal thoracic vessels: report of two cases

Rasheed A. Saad*

Cardiopulmonary Transplant Unit, Freeman Hospital, High Heaton, Newcastle upon Tyne, NE7 7DN, UK

Received 11 February 2002; accepted 27 March 2002

I read with interest the case report by Hassan et al. [1] describing two cases of iatrogenic internal mammary arteriovenous fistula.

Arteriovenous fistula of the internal mammary artery (IMA) is still an extremely rare complication following cardiac and thoracic procedures. The incidence of internal mammary arteriovenous fistula is likely to increase as a result of the globally increasing number of cardiac and thoracic surgical procedures.

Early treatment of internal mammary arteriovenous fistula has been recommended to avoid all potential complications. However, because spontaneous closure of a small fistula may occur [2], an initial period of close observation of the patient may be justified.

I note in case 1 that you have had recurrence of the internal mammary arteriovenous fistula after percutaneous endovascular embolization. Did you embolize both antegrade and retrograde pedicles of the fistula? Silva et al. [3] recommended embolization of the antegrade as well as the retrograde pedicles to prevent recurrence secondary to retrograde flow from the superior epigastric artery.

References

- [1] Hassan A, Campbell DR, Bethune DC, Ali IS. Fistula of the internal thoracic vessels: report of two cases. *Eur J Cardiothorac Surg* 2002;21:358–360.
- [2] Monrad P, Masson D, Charbonnier B, Lavigne G, Brehier J. Fistules arterioveineuses iatrogenes a partir de l'artere mammaire interne. Fermeture spontanee. *Arch Mal Coeur Vaiss* 1981;74(1):105–110.
- [3] Silva J, Gonzalez-Santos J, Perez M, Ruiz M, Vallejo JL. Iatrogenic mammary arteriovenous fistula caused by sternal wire. *Ann Thorac Surg* 1998;66:1398–1399.

* Tel.: +44-191-2843111; fax: +44-191-2231177.

E-mail address: rasheed5@hotmail.com (R.A. Saad).

PII: S1010-7940(02)00214-2