

whether the first patient reported took his Ecstasy at a rave would have been useful, and the amount of physical exertion undertaken by both patients would have been relevant to dissecting out the aetiology.

It is interesting that the context in which Ecstasy is taken in the UK appears to define a unique spectrum of adverse reactions. The intense dancing in the hot environment of a rave with inadequate rehydration can exacerbate Ecstasy induced hyperthermia, with associated metabolic acidosis, disseminated intravascular coagulation, rhabdomyolysis, and acute renal failure.⁷ This sequence of events is rarely seen if Ecstasy is not mixed with physical exertion. Spontaneous pneumomediastinum may be a further rare specific adverse reaction of Ecstasy to be added to the list.

The report by Rezvani *et al* highlights the need to consider the diagnosis of pneumomediastinum as well as pneumothorax and

pneumopericardium in young illicit drug users with pleuritic chest pain. This is true whether they inhale their drugs or not, and is especially important to consider because the clinical signs are not always obvious.

- 1 Haim DY, Lippmann ML, Goldberg SK, Walkenstein MD. The pulmonary complications of crack cocaine. *Chest* 1995;107:233-40.
- 2 Kline JN, Hirasuna JD. Pulmonary edema after freebase cocaine smoking - not due to an adulterant. *Chest* 1990;97:1009-10.
- 3 Cucco RA, Ok Hi Yoo, Cregler L, Chang J. Nonfatal pulmonary edema after "freebase" cocaine smoking. *Am Rev Respir Dis* 1987;136:179-81.
- 4 Forrester JM, Steele AW, Waldron JA, Parsons PE. Crack lung: an acute pulmonary syndrome with a spectrum of clinical and histopathologic findings. *Am Rev Respir Dis* 1990;142:462-7.
- 5 Levine AJ, Drew S, Rees GM. Ecstasy induced pneumomediastinum. *J R Soc Med* 1993;86:232-3.
- 6 Abolnick I, Lossos IS, Breuer R. Spontaneous pneumomediastinum: a report of 25 cases. *Chest* 1991;100:93-5.
- 7 Henry JA. Ecstasy and the dance of death. *BMJ* 1992; 305:5-6.

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Expandable metal stents for non-malignant bronchial obstruction

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Abstract

An expandable metal stent was inserted to relieve bronchial obstruction following lobectomy for localised squamous carcinoma which had not been relieved by bronchoplasty with a Goretex flap. This resulted in substantial improvement in lung function and exercise tolerance for nine months, following which severe inflammation around the stents required residual pneumonectomy.

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In recent years bronchial stents have been used as palliative measures for bronchial obstruction in malignant conditions, but seldom in benign disease. The following case illustrates the potential use of such stents in a non-malignant setting.

Case report

A 53 year old woman presented with haemoptysis and a left upper lobe mass on her chest radiograph. After staging this was shown to be a localised squamous carcinoma and she

underwent a left upper lobectomy with stapling of the bronchial stump. Postoperatively she developed shortness of breath with wheeze at 24 hours and rigid bronchoscopy revealed severe narrowing of the left lower lobe bronchus at the level of the resected upper lobe. At immediate reoperation the diagnosis was made of bronchial stenosis from bronchial tenting (excess resection of the upper lobe origin from the main bronchus caused by excess pulling with the stapler). The narrowed segment of the residual main bronchus was widened along the whole length of the affected bronchus using a patch of Goretex (surgical bronchoplasty); a sleeve resection was not suitable because of the length of its stenosis. The patch appeared satisfactory and she made a good early postoperative recovery with a reasonable exercise tolerance.

Six weeks later she had become short of breath on 10 minute exertion and on lying down; she had a wheeze, and persistent cough not responding to antibiotics or bronchodilators. The wheeze was most prominent on the left side and there was poor air entry to the left lung. Fibreoptic bronchoscopy revealed bronchial stenosis from the bronchoplastic flap which collapsed in inspiration. The patient was referred for endoscopic stenting. Spirometric tests showed a forced expiratory volume in one second (FEV₁) of 1.36 litres and a forced vital capacity (FVC) of 1.80 litres. Further investigation did not reveal any evidence of tumour recurrence. Rigid bronchoscopy confirmed occlusion of the left lower bronchus due to inward bulging of the Goretex with some additional distal stenosis.

Three Gianturco expandable wire stents, 2.5 cm long by 2 cm maximum external diameter, were sequentially inserted along the narrowed bronchus, resulting in visibly improved pat-

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ency. Immediately postoperatively her dyspnoea was much improved and her FEV₁/FVC increased to 1.82/1.96 litres. A chest radiograph confirmed correct positioning of the stents. Marked symptomatic improvement in exercise tolerance developed and at three months she was walking 100 yards without wheeze or breathlessness. The FEV₁/FVC were now 1.70/2.13 litres and chest radiography indicated further stent expansion (fig 1).

She maintained her good progress for six months with satisfactory expansion of the left lower lobe, but by nine months she had gradually become more short of breath, especially when lying down, and she was unable to climb stairs. An easily audible wheeze was again present over the left chest. Further rigid bronchoscopy now showed moderate inflammation with granulation tissue around the endobronchial lumen causing narrowing of the stented segments. The Goretex was partly visible and appeared satisfactory; it did not indent. Biopsy samples of the granulation tissues were taken which showed histiocytic inflammation without malignancy. Bronchoscopic excision of this granulation tissue on two occasions over the next three months gave moderate symptomatic relief until severe breathlessness similar to that before stent placement and marked wheeze with occasional whistling necessitated reappraisal. Residual pneumonectomy, solely for symptomatic improvement, was discussed and accepted.

At pneumonectomy the severe inflammation around the stented bronchus was easily visible. In the main bronchus one stent had to be removed because the wire encroached close to the trachea and was affecting a clean bronchial stump; this wire proved difficult to remove. Histological examination of the bronchus around the stent showed chronic granulation tissue with an inflammatory reaction both around and extending into the stent. Her initial postoperative course was excellent. She developed a late wound infection which resolved quickly. Eight months after the pneumonectomy she is in good general health and able to

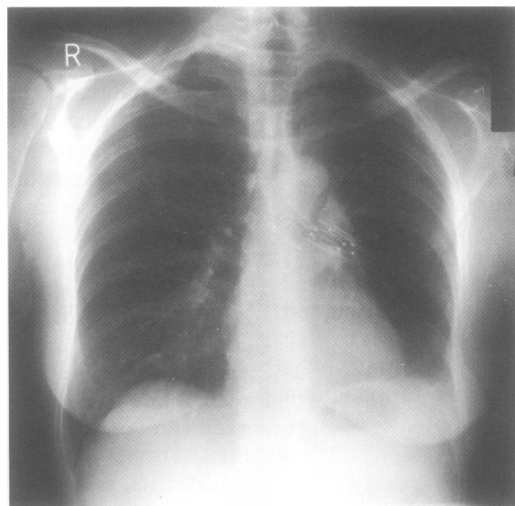


Figure 1 Chest radiograph showing stent in situ three months after insertion.

climb 14 stairs. Her current spirometric values are FEV₁ 1.22 litres and FVC 1.42 litres with a small (19%) improvement with bronchodilators (FVC = 1.69, FEV₁ = 1.27); these figures resemble those with lower lobe occlusion prior to stenting.

Discussion

As a consequence of potentially curative surgery by upper lobectomy, tenting of the bronchial stump by the stapler caused bronchial stenosis. This is a trap caused by endeavours to obtain maximum bronchial clearance with the use of bulky bronchial staplers. The stenosis recurred despite surgical bronchoplasty with a Goretex flap, and shows the disadvantage of using an unreinforced patch in the bronchus.

Expandable metal stents provide an alternative to surgery for treatment of bronchial narrowing. They are relatively quick to insert, require only a short hospital stay, and tend to become epithelialised with time,¹ which should allow mucociliary clearance of secretions.² In our patient stent insertion resulted in a substantial improvement in lung function and exercise tolerance in the short term, reversing a crippling complication of her surgery.

Stents are almost always used in cases of incurable lung cancer as a palliative measure² and our patient is unusual in that, having no evidence of active tumour after lobectomy, she presented as a benign category for stent usage.

There are few data on the long term effects of stent insertion. Experimental studies have found inflammation and granuloma formation to be associated with stent placement in animals but not in humans.¹ The later follow up of this patient records extensive inflammation and granulation formation, similar to Wallace's experience with animals.¹ Stent migration, though rare, has been reported³ as has the theoretical risk of fistula formation.² Gianturco metal stents have hooks which embed in the bronchial walls, making them extremely difficult to remove, and they are thus often considered as permanent.⁴ This characteristic was confirmed at pneumonectomy in this patient.

Stents can be used in benign or malignant bronchial conditions. There is still concern about their potential long term tolerance and the consequences of a foreign body in the bronchus in potentially benign conditions. This is the first case of inflammation and granulation formation causing recurrent stenosis and the need for stent removal. It should caution against overzealous use of stents which should be reserved for cases in which other therapeutic options are absent or hazardous.

- Wallace MJ, Charnsangavej C, Ogawa K, Carvasco CH, Wright KC, McKenna R, *et al.* Tracheobronchial tree: expandable stents used in experimental and clinical applications. *Radiology* 1986;158:309-12.
- George PJM, Rudd RM. Respiratory stents. *Br J Hosp Med* 1992;47: No 6.
- Hind CRK, Donnelly RJ. Expandable metal stents for tracheal obstruction: permanent or temporary? A cautionary tale. *Thorax* 1992;47:757-8.
- Simonds AJ, Irving JD, Clarke SW, Dick R. Use of expandable metal stents used in the treatment of bronchial obstruction. *Thorax* 1989;44:680-1.