Technical reports

Postmortem examination of the lungs: a preservation technique for opening the bronchi and pulmonary arteries individually without transection problems

T A McCulloch, G N Ruttly

Abstract

The classic methods of examining both the pulmonary arteries and bronchi post-mortem partly destroy the anatomy of one of these systems. A technique is described whereby the bronchi and pulmonary arteries are dissected and preserved. The principal difference of this technique is that most of the upper lobe vasculature is opened from the hilum. The exception to this is the lingula, which because it is the embryological homologue of the right middle lobe should be treated in the same way—that is, with the vessels opened from the pleural side and the bronchi from the hilum. One general practical point is that there is a great variation in the number of pulmonary arterial branches in each lobe, particularly in the upper lobes, and especially in the left upper lobe. Furthermore, there is some variation in the local anatomic relations of the vessels and bronchi and on occasion the technique will not work as described and will require some modification. However, most of the time this technique should allow the pathologist to preserve the anatomy of the bronchial tree and pulmonary arteries for

better demonstration and photographic purposes when the need arises.

(*J Clin Pathol* 1998;51:163–164)

Keywords: necropsy; lungs

Department of
Histopathology,
Nottingham City
Hospital, Hucknall
Road, Nottingham
NG5 1PB, UK
T A McCulloch

Department of
Forensic Pathology,
Watery Street,
Medico-Legal Centre,
Sheffield S3 7ES, UK
G N Ruttly

Correspondence to:
Dr McCulloch.

Accepted for publication
11 November 1997

One of the eternal problems of postmortem practice is the lack of any satisfactory method for examining both the pulmonary arteries and bronchi fully without at least partly destroying the anatomy of one of these systems. Most of the classic texts describe methods for examining the lungs that consist of either purely slicing them^{1–4} or opening both the arteries and bronchi from either the hilum⁵ or the pleural side of the interlobar fissure.⁶ Many pathologists however have been taught to open the bronchi from the hilum and the arteries from the interlobar fissure.⁷ In practice, this method inevitably means transecting either some of the bronchi or vessels (depending on which are opened first) usually in the upper lobes because of the local anatomic relations. Here we present a modification of this technique that goes some way to solving the problem. We recognise that because this method is not in any standard texts, it does not mean that it is not already practised; however, a straw poll of colleagues suggested that this method is not generally (if at all) known.

Methods

Having separated the lungs from the thoracic pluck, the lung is held resting over the palmar surface of the hand, hilar side down, which exposes the fissure. A knife is used to cut into the visceral pleura directly opposite the hilum. The first structure encountered will be the pulmonary artery as this is the most dorsolateral structure of the bronchovascular bundle. Without transecting the vessel the arterial branches to the lower lobe can be opened in the usual manner with a pair of blunt ended scissors. Next, from the same aspect, the branches to the lingula on the left, and the middle lobe on the right are opened, each usually having one or two arterial branches (fig 1). The branch to the middle lobe passes anteriorly and can be awkward to insert the scissor tips into but is best opened from this aspect.

Figure 1 Left lower lobe and lingular (arrows) pulmonary arteries opened from the fissure.

Figure 2 Left upper lobe arteries opened from the hilum.

Figure 3 Left lower lobe and lingular (arrows) bronchi opened from the hilum. (Upper lobe on left.)

Figure 4 Left lung. All bronchi open. (Upper lobe on left.)

The right middle lobe and lingula are embryological homologues and so should be dissected in similar ways. First, the initial cut into the visceral pleura on the right should be between the upper and lower lobes, not between the middle and upper lobes (that is, in

the oblique and not the transverse fissure). Second, the arteries are best opened from the pleural aspect and the bronchi from the hilum, unlike the rest of the upper lobes. Next the lung is turned back onto the pleural side, hilum upwards. From the hilum the arteries to the upper lobe, excluding the lingula on the left, are opened. Normally this technique will expose all the arteries without damaging any major order bronchi (fig 2).

Having dissected the arteries, the bronchi to the lower lobes, middle lobe, and lingula are opened from the hilum. At this point usually no bronchi or pulmonary arteries should have been divided during the dissection (fig 3).

Finally, the upper lobe bronchi (excepting the lingular bronchi) are opened from the hilum. This is the only point in the dissection where any of the vessels may be transected in this method. However, as the bronchi lie underneath the arteries at this point, if the scissors are advanced at an angle it is possible to open the bronchi by going under the arteries, thus keeping both the vessels and airways intact (fig 4).

Discussion

We describe a technique whereby the bronchi and pulmonary arteries are dissected and, if correctly done, preserved. The principal difference between this technique and that previously described by Cotton and Cross⁷ is that most of the upper lobe vasculature is opened from the hilum. The exception to this is the lingula, which because it is the embryological homologue of the right middle lobe should be treated in the same way—that is, with the vessels opened from the pleural side and the bronchi from the hilum. One general practical point is that there is a great variation in the number of pulmonary arterial branches in each lobe, particularly in the upper lobes, and especially in the left upper lobe. Indeed, it was a surgical aphorism of the late Lord Brock that when performing a left upper lobectomy “there is always one more branch than you think”.⁸ Furthermore, there is some variation in the local anatomic relations of the vessels and bronchi and on occasion the technique will not work as described and will require some modification. However, most of the time this technique should allow the pathologist to preserve the anatomy of the bronchial tree and pulmonary arteries for better demonstration and photographic purposes when the need arises.

We thank Ian Newsome and David Jarvis for preparing the photographs.

- 1 Box CR. *Post-mortem manual. A handbook of morbid anatomy and post-mortem technique*. London: J and A Churchill, 1910:53–6.
- 2 Saphir O. *Autopsy diagnosis and technic*. New York: Paul B Hoeber Inc, 1951:217.
- 3 Knight B. *Forensic pathology*. 2nd ed. London: Arnold, 1996: 25.
- 4 Wilson RR. *Methods in morbid anatomy*. London: Butterworths, 1972:83–5.
- 5 Baker RD. *Postmortem examination: specific methods and procedures*. Philadelphia: WB Saunders, 1967:86–8.
- 6 Ludwig J. *Current methods of autopsy practice*. 2nd ed. Philadelphia: WB Saunders, 1979:51–3.
- 7 Cotton DWK, Cross SS. *The hospital autopsy*. Oxford: Butterworth-Heinemann, 1993:59–62.
- 8 Bannister LH. The respiratory system. In: Williams PL, ed. *Gray's anatomy*. 38th ed. New York: Churchill Livingstone, 1995:1657–61.