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978-0-521-10568-2 - Atlas of Post-Mortem Techniques in Neuropathology

J. Hume Adams and Margaret F. Murray

Excerpt

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1. The Brain

Before commencing a post-mortem examination on any patient known to have had some neurological disease, the pathologist must consider - preferably in consultation with the clinician - what special steps might have to be undertaken prior to fixing the brain. If there is any clinical suspicion of meningitis, some of the exudate should be sent for bacteriological examination - microbiologists prefer exudate itself rather than a swab; if any type of encephalitis has been considered in the differential diagnosis, representative samples of brain tissue should be placed in an appropriate transport medium and sent for virological examination - and also samples of blood and cerebrospinal fluid for serological studies; if there is a possibility of some lysosomal enzyme deficiency, e.g. one of the neuronal storage disorders, or an unusual type of demyelinating disease, some brain tissue should be deep frozen as quickly as possible in case it is required later for neurochemical analysis; and if the post-mortem examination is being undertaken soon after death, the possibility of taking samples of the brain for electron microscopy should be borne in mind.

There are two basic principles in removing the brain - all structures holding it in position must be cut without inflicting any damage on the brain, and undue stretching of the brain stem must be avoided since it is very liable to tear at the level of the midbrain (see Fig. 1.26). It is not difficult to remove a

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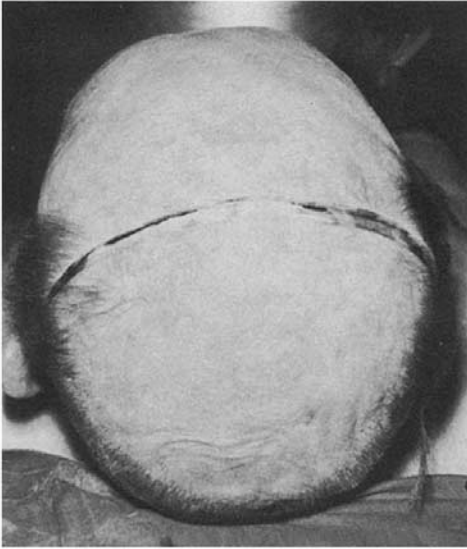
The Brain

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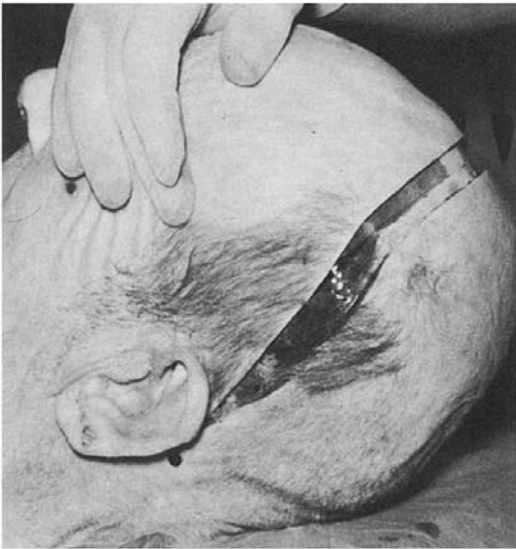
normal brain if an adequate exposure has been attained. If, however, it is enlarged for any reason, either as a result of an intracranial expanding lesion or of diffuse brain swelling, the increased volume of the brain makes access to the various structures that have to be cut more difficult. In such circumstances, therefore, particular care has to be exercised. Furthermore, if there is blood or pus in the subarachnoid space, many of the structures to be cut are obscured and sometimes some of these have to be cut blind. Hence the importance of becoming competent in removing normal brains so that one already knows the technique.

Before starting to remove the brain examine the scalp, face and neck carefully for any lacerations, abrasions or surgical incisions. Pay particular attention to the occipital region since lesions there are often not immediately obvious. Retract the eyelids to see if there is any subconjunctival haemorrhage.

Figs. 1.1 and 1.2 Make a transverse incision with a scalpel through the scalp, starting behind one ear and ending behind the other.



1.1



1.2

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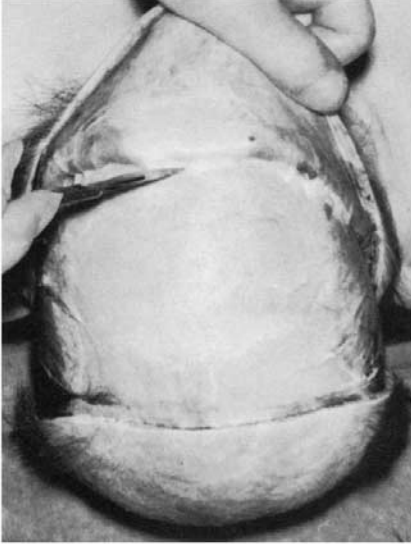
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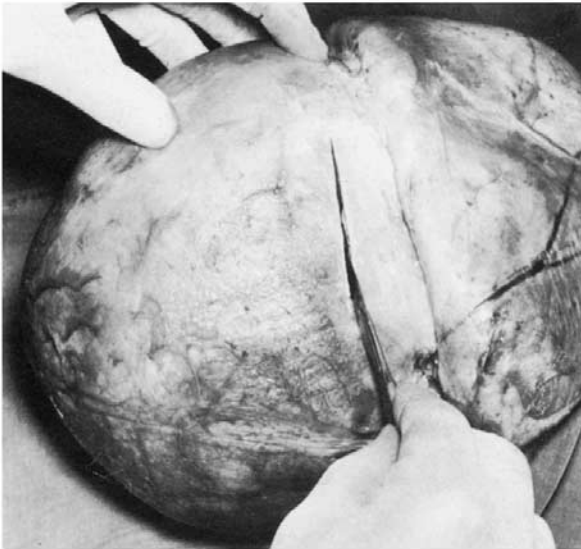
Fig. 1.3 Reflect the scalp forwards using a scalpel where required to separate the scalp from the skull up to but not beyond the supra-orbital ridges (the level of the eyebrows). Reflect the scalp in a similar manner posteriorly towards the occiput. Note if there is any blood clot deep to the scalp and if there is any haemorrhage into or bruising of its deep surface. Examine the vault of the skull for any evidence of fracture and note its size and its location. One of the best ways of recording fractures of the skull is diagrammatically on line drawings of the skull. Note also the size and position of any neurosurgical procedures, such as burr holes or a craniotomy.

Removal of too small a portion of the vault of the skull is one of the commonest faults in neuropathological post-mortem technique: a large part has to be taken away if the brain is to be removed easily and undamaged. Anteriorly the saw cut should lie about 1.0 cm above the supra-orbital ridge and then be continued horizontally on each side to behind the ear.

Fig. 1.4 As a preliminary step it is helpful to cut through the temporal muscle at this level and scrape some of it off the skull for a short distance above and below this incision so that the saw will have clear access to the bone. If the cut in the temporal muscle is made lower than suggested, the saw will go through the petrous part of the temporal bone leaving a sharp bony spur on the skull cap which will inevitably damage the brain when the skull cap is being removed.



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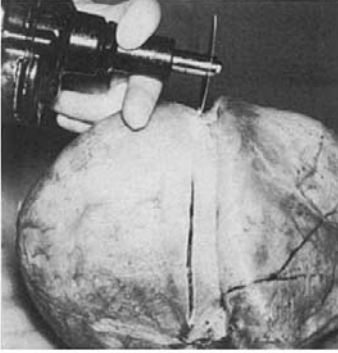
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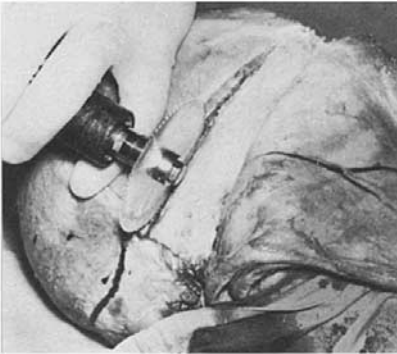
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Figs. 1.5 - 1.7 There is great variation in the thickness of the skull in different individuals, and in any individual it is thicker in the frontal and occipital regions than in the temporal bone immediately above the ear. Since it is important to try to leave the dura - the fibrous sheet immediately deep to and attached to the skull - intact, the undersurface of the spindle of the saw should be supported by one hand so as to prevent the saw blade plunging through the dura into the underlying brain. Particular care must be taken when sawing through the temporal bone immediately above the ear since the bone here is often as thin as 2-3 mm.

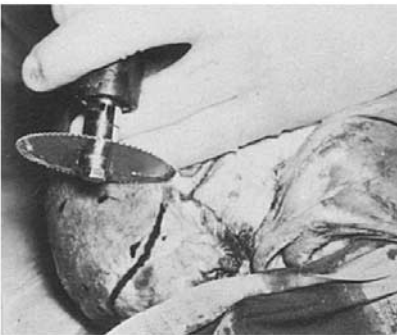
The saw cut should be started anteriorly about 1 cm above the level of the supra-orbital ridges. If the cut is made higher than this, difficulty will be encountered later in freeing the frontal lobes. If it is made lower than this, the saw cut will almost certainly go through the frontal sinuses; this, however, is not a very serious problem unless the sinuses are unusually large. The saw cut should be continued horizontally on either side of the skull through the incisions made in the temporal muscles to just behind the ears. The saw cut should then be angled slightly upwards to reach the midline immediately above the external occipital protuberance which is easily palpable as a distinct prominence at the back of the skull.



1.5



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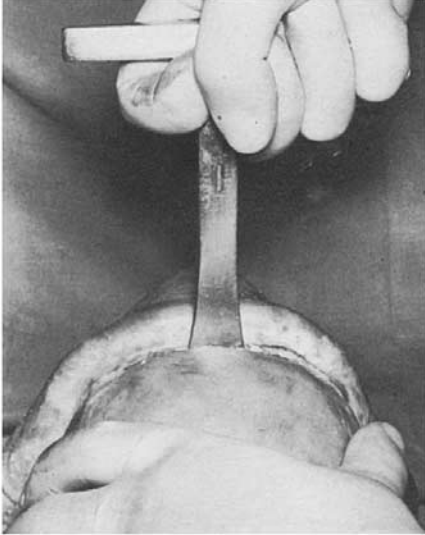
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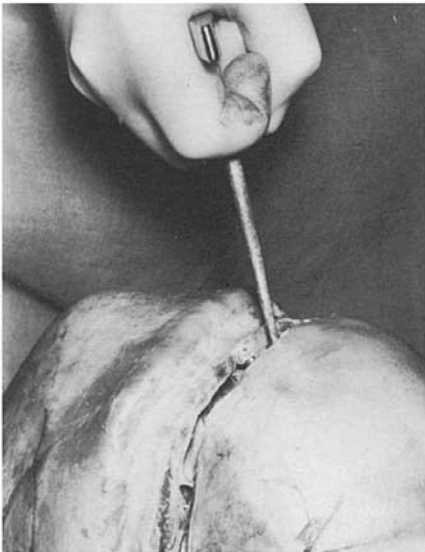
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Figs. 1.8 and 1.9 Prise the skull cap loose by twisting a T-shaped chisel along the saw cut. A gentle tap with a mallet is permissible at this stage if the skull has not been completely cut through. Strong hammering must be avoided since this may produce damage to the bone that might be misinterpreted as a fracture. It is essential that the skull cap be loosened around the entire saw cut before any attempt is made to remove it.

Note if any blood or fluid runs out of the skull as the skull cap is being freed from the remainder of the skull, and try to measure its approximate volume.



1.8



1.9

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Figs. 1.10 and 1.11 The dura is sometimes so loosely attached to the skull cap that the latter can be removed fairly easily simply by pulling it with the fingers backwards from the forehead. On the other hand, particularly in old age and in infancy, the dura may be very firmly adherent to the skull cap with the result that it can only be removed with considerable difficulty. In these circumstances it is helpful to insert a malleable spatula (Fig. 1.10) between the dura and the skull cap to help to separate one from the other. Care must be taken not to damage the surface of the brain but this can usually be avoided if the dura was not opened when the saw cut was being made in the skull. When some difficulty is experienced in separating the skull cap from the dura, there is a distinct tendency when retracting the skull cap from the forehead for the posterior part of the skull cap to plunge into the occipital lobes. This can really only be prevented if virtually complete separation of the dura from the skull cap has been achieved with the spatula. If the dura is particularly adherent, less damage is likely to be done to the brain if the skull cap is retracted forwards and upwards from the occipital region. When the skull cap has been removed, the underlying dura should be intact (Fig. 1.11).

Most extradural haematomas tend to remain attached to the dura and if one is present its site, size and approximate thickness should be recorded before proceeding further.