The nasal:paranasal block technique

Preparation and uses

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HUMAN nasal and paranasal cavities removed at autopsy can be used either for pathological study or for anatomical dissection, both of which are needed for otorhinolaryngological training programmes. They are also useful for improving our knowledge of the pathologic basis for nasal and paranasal sinus disease.

Freshly removed nasal: paranasal (NP) blocks can be wrapped in paper, with all the air expelled, and frozen. Such specimens provide a ready source of cadaver specimens for teaching microscopic surgery of the nose and sinuses. They contain the nasal septum, most of the lateral nasal walls with attached turbinates, ethmoidal air sinuses, and parts of the frontal, maxillary and sphenoidal air sinuses. It is not practical to perform microsurgical exercises on the nose and sinuses of the intact body in the post-mortem room. Appropriate surgical instruments and operating microscopes are not readily available and it is difficult to position the head. Prolonged procedures in the post-mortem room also interfere with the work schedules of the pathologists.

When the medical history indicates that the deceased has had problems with his nose and sinuses, the specimens are selected for pathological study. Specimens of nasal and paranasal disorders provide material for undergraduate and postgraduate teaching and extend our knowledge of nasal and paranasal pathology.

Technique of block removal

A portion of the nose and paranasal sinuses adequate for dissection or histological study can be acquired at autopsy without disfigurement of the head after the brain has been removed. The olfactory nerves should be severed with a sharp knife rather than avulsed from the cribriform plate when removing the brain. Specimens removed for pathological study should be fixed as soon as possible after death to minimize postmortem autolytic changes.

Removal of the NP block requires the use of an oscillating bone plug saw. A 2·25-inch diameter modified temporal bone saw, adjusted to a depth of 1·5-inch, is used for the adult skull and a 1·5-inch diameter saw adjusted to 1-inch depth is used for smaller skulls (Fig. 1).

The saw is centred over the crista galli (bony prominence separating the two cribriform plates) and directed perpendicular to the nasal bridge

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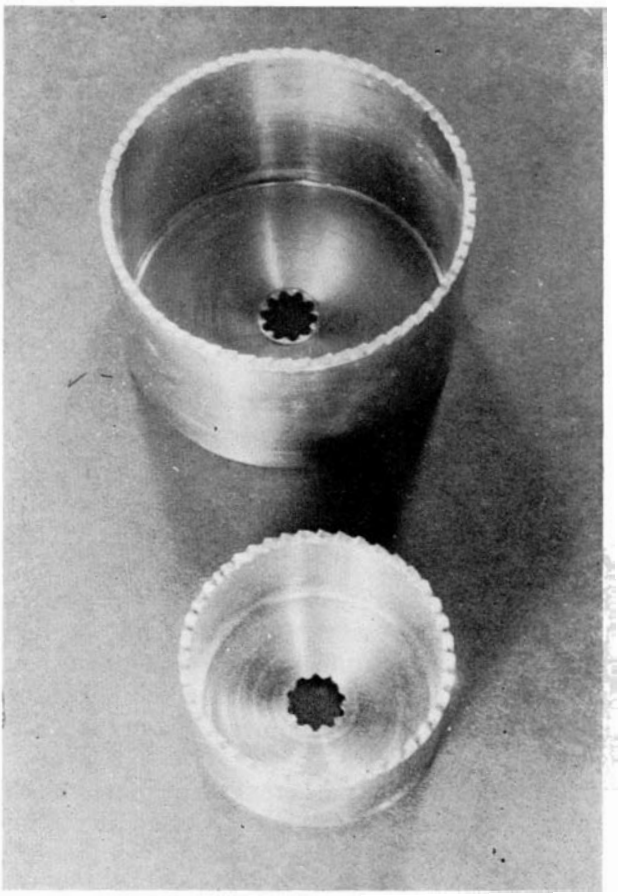


FIG. 1
Oscillating bone saw blades, adult's and child's size.

(dorsum of the nose) as seen in Figs. 2, 3, 4, and 5. The head is steadied by an assistant to avoid stressing and breaking the saw blade. A stream of water is directed on the blade to prevent bone dust from accumulating between the cutting teeth. The cutting performance can be improved by constant slight rotation of the saw. The cut is complete when the blade reaches the hard palate. After removal of the saw, the bone plug is grasped with a lion-jawed forceps and rotated and retracted so that all the remaining attachments are severed with a knife, scissors or osteotome. No external deformity of the heads results after removing the block.

The specimen removed encompasses all the anatomical structures required for either surgical dissection or histological study (Fig. 6). Furthermore, it is easy to remove, it can be placed in the fixative solution without further trimming, and it is easy to process and prepare for histological study.

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Endo-nasal microsurgical dissection

Equipment and supplies

1. Zeiss operating microscope with different objective lenses.
2. Dissection table with special bone holders.
3. High-speed drill engine complete with burrs.
4. Complete set of endonasal microsurgical instruments.
5. Microscope draps, surgical gloves.
6. Fresh bone blocks.

Mounting the bone block

The specimen is mounted on a temporal bone holder in the 'operating' position so that the cribriform plates and crista galli are away from the surgeon and the lower end of the nasal septum is facing him (Fig. 7).

Surgical instruments

The various instruments used in nasal surgery should be identified and their purposes or specific uses understood. Methods of holding and manipulating instruments should be discussed.

Surgical exercises

The following microsurgical techniques may be practised:

1. Septoplasty.
2. Submucous resection of the septum.
3. Septal cartilage autograft.
4. Trans-septal procedures, e.g. vidian neurectomy, sphenoidotomy, hypophysectomy.
5. Endo-nasal microplasty (for atrophic rhinitis).
6. Repair of septal perforation.
7. Submucous turbinectomy, middle and inferior.
8. Intranasal antrostomy.
9. Endo-nasal dacryocystorhinostomy.
10. Endo-nasal reconstruction of naso-frontal duct.
11. Intra-nasal ethmoidectomy.
12. Decompression of the optic nerve.
13. Cerebrospinal fluid rhinorrhea procedures.
14. Nasal dermoplasty.
15. Trans-nasal procedures, e.g. vidian neurectomy, ganglionectomy.
16. Dacryocystantrostomy.

Histopathological processing

Total organ nasal:paranasal sectioning can make a valuable contribution to the field of rhinology. A three dimensional macroscopic and microscopic study of the entire nasal:paranasal block is possible. The technique

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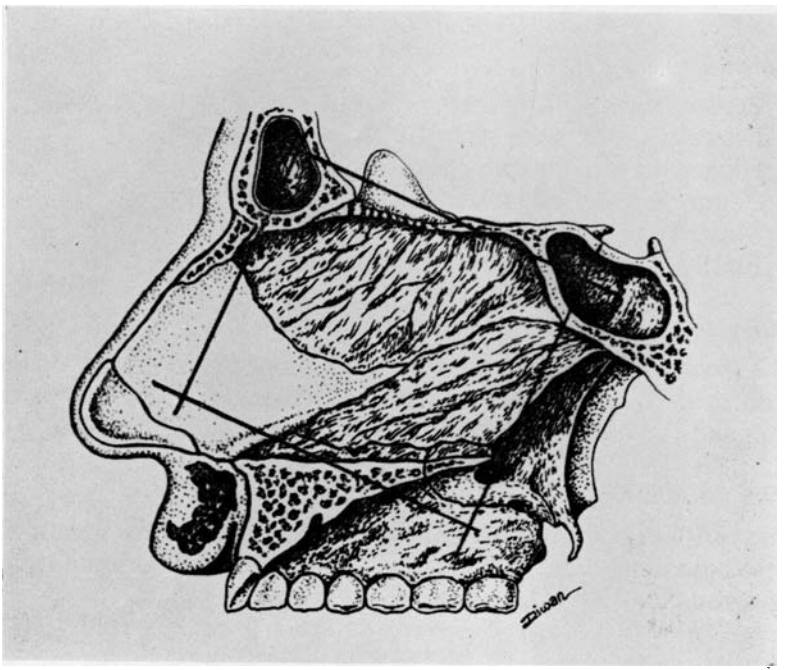


FIG. 2

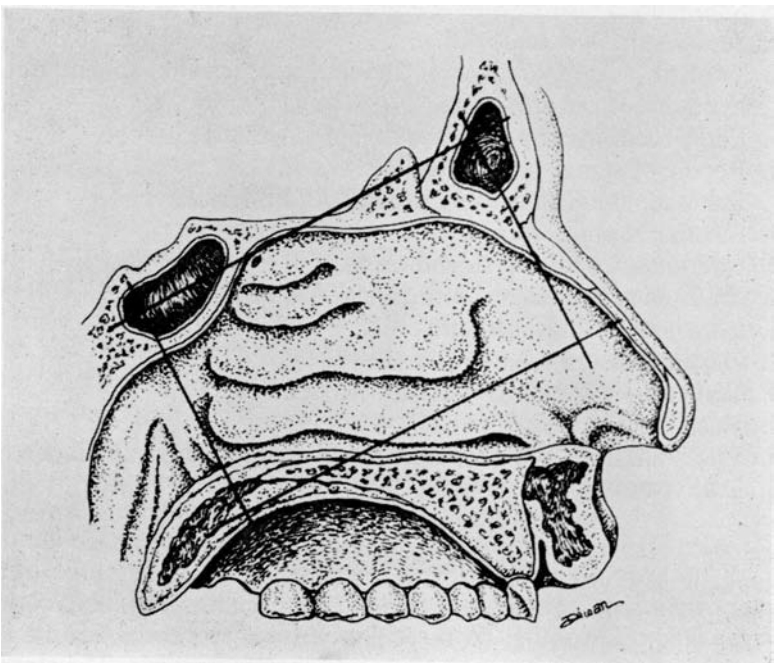


FIG. 3

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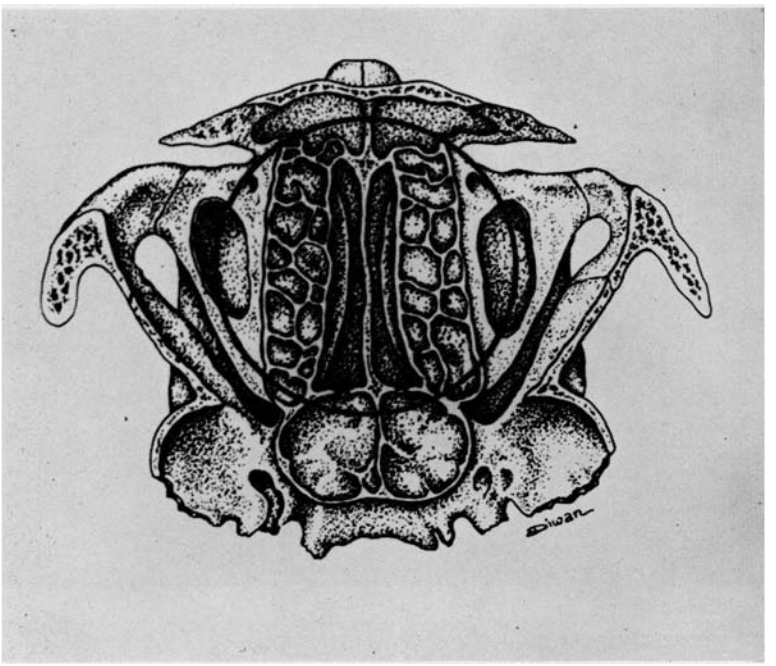


FIG. 4

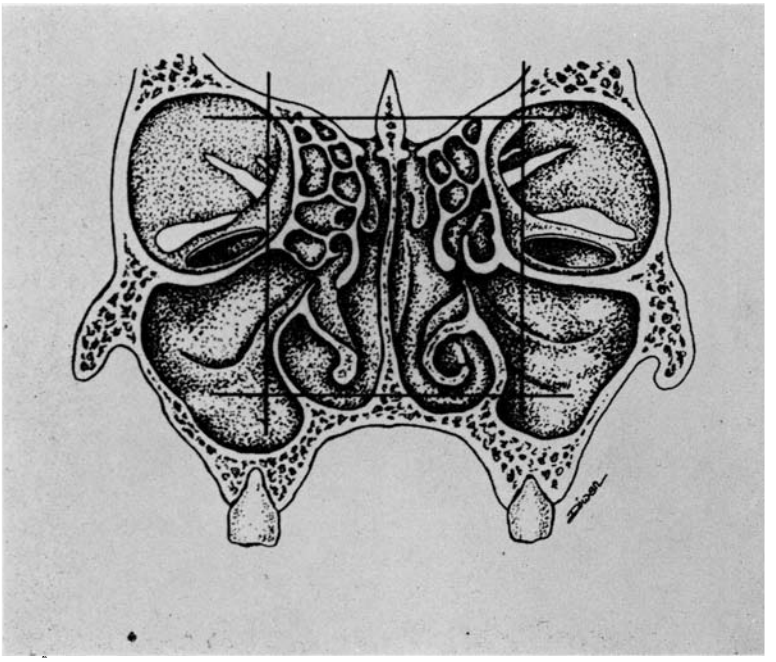


FIG. 5

FIGS. 2, 3, 4, 5

Outlines of the nasal:paranasal (NP) block.

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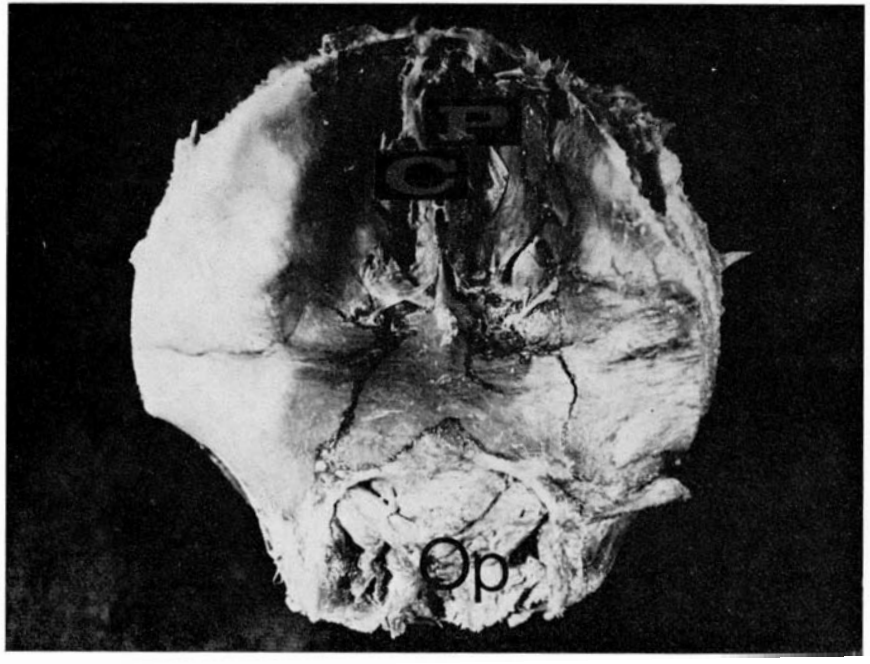


FIG. 6a

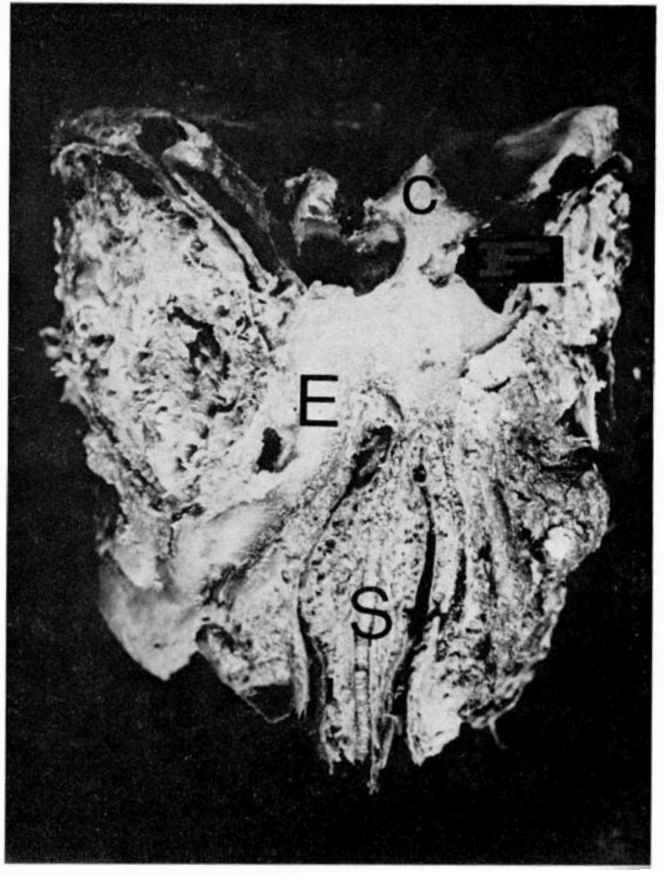


FIG. 6b

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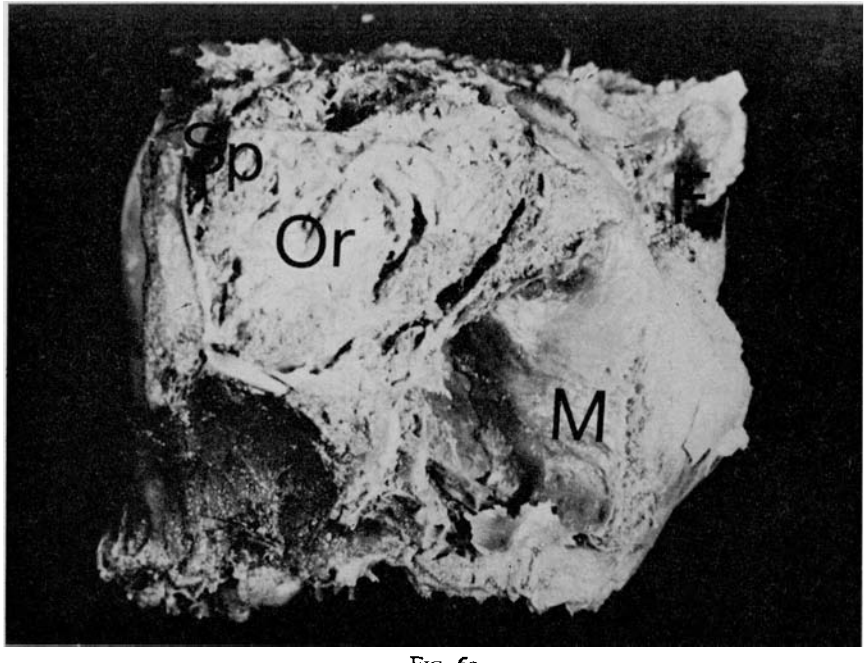


FIG. 6c

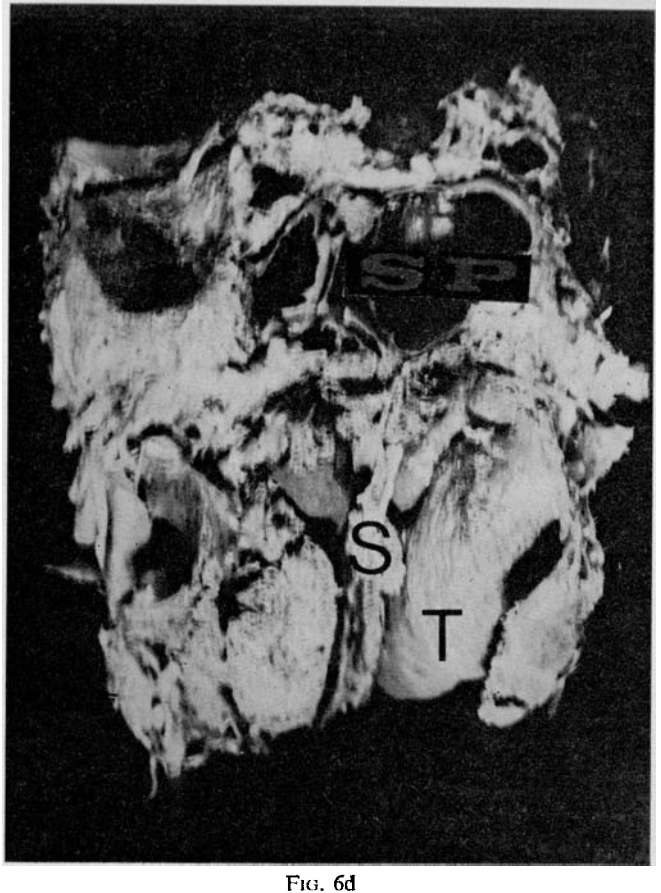


FIG. 6d

FIG. 6

The nasal:paranasal block.
(A) Upper surface showing the crista galli (C), cribriform plate (P) and optic chiasma (op).
(B) Anterior surface showing the nasal septum (S), ethmoidal sinuses (E), frontal sinus (F), and crista galli (C).
(C) Lateral surface showing the maxillary sinus (M), orbit (O), and sphenoid sinus (Sp).
(D) Posterior surface showing the nasal septum (S), inferior turbinate (T), and sphenoidal sinus (Sp)

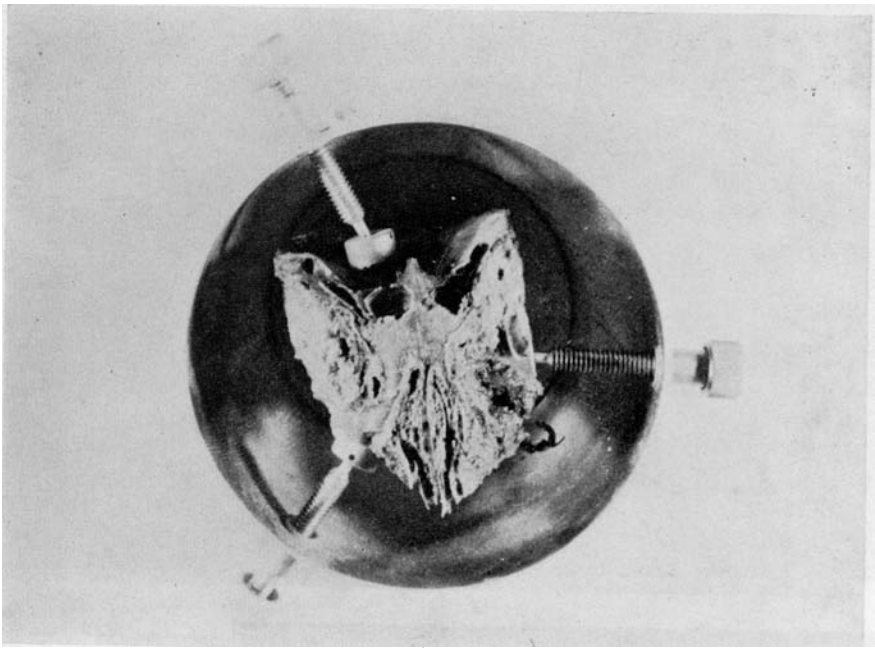


FIG. 7
Mounted nasal:paranasal block on a temporal bone holder.

can be applied to the study of both embryology and anatomy as well as to the different pathological conditions involving the nasal cavity (respiratory and olfactory portions) and the paranasal sinuses. The following steps for histopathological processing of the (NP) blocks are required:

1. Fixation: Each block is placed in a 500 cc glass jar with a sealed top containing 300 cc of 10 per cent formaldehyde solution. The jar is placed in the refrigerator for a period of 48 hours. The solution need not be changed.

2. Decalcification: The block is removed from the fixative, washed in tap water and placed in 300 cc 5 per cent nitric acid. The acid solution is changed three times per week for six weeks. This procedure and subsequent procedures are performed at room temperature.

The end point of decalcification is determined by either the chemical test or by X-ray.

3. Washing: In running tap water for 24 hours.

4. Neutralization: The block is placed in 300 cc of 5 per cent sodium sulphate for 8-24 hours to improve the staining quality of the tissues.

5. Dehydration: This is achieved over a ten-day period. The specimen is placed in a series of alcohols of increasing concentrations from 50 per cent to absolute alcohol then in ether-alcohol (1:1) mixture.

6. Embedding: The specimen is embedded either in celloidin or paraffin.

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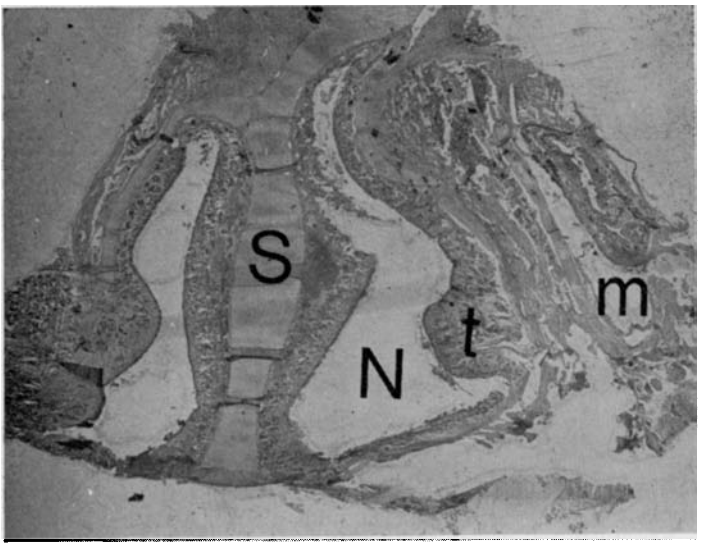


FIG. 8

Coronal section of the nasal cavity and paranasal sinuses, H. & E. stain. M: maxillary sinus. N: nasal cavity. S: nasal septum. T: inferior turbinate.

7. Sectioning: The anatomical landmarks used for orienting the specimen for cutting sections are the caudal end of the nasal septum and the crista galli separating the cribriform plates. The (NP) block is sectioned on a sliding microtome in the frontal (coronal) plane. The sections are usually cut at a thickness of 20 microns. All sections are placed on pieces of onion-skin paper which are consecutively numbered and every tenth section is removed and placed in 80 per cent alcohol solution.

8. Staining: The tracer set of sections are floated off the onion-skin papers into tap water and stained with haematoxylin and eosin in the usual way.

9. Mounting: The sections are mounted on glass slides using canada balsam and then protected with a cover slip. (Fig. 8.)

10. Storage: Each slide is identified by appropriate lettering. The set of slides from each block is then stored together.

Summary

A new technique for removing nasal:paranasal blocks at autopsy is described. The technique allows the removal of these cavities without disfigurement of the head after the brain has been removed. The importance of the technique in relation to training on endo-nasal micro-surgery, and histopathological study of nasal and paranasal disorders is emphasized.

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