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Improving paranasal sinus computed tomography reporting prior to functional endoscopic sinus surgery – an ENT-UK panel perspective

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Dear Editors,

We read with interest the article entitled 'Improving paranasal sinus computed tomography reporting prior to functional endoscopic sinus surgery – an ENT-UK panel perspective'.[1] The authors have identified an important and topical issue, and report important data highlighting a lack of confidence in one-third of surgeons who interpret computed tomography (CT) scans prior to functional endoscopic sinus surgery (FESS).

Reflecting upon this finding, we would draw an alternative conclusion to the one suggested by the authors. Extensive practical checklists for CT interpretation have been published, and we would agree that optimal practice would see a formal report adhering to such a checklist available before undertaking FESS.[2,3] However, we would contend that the safer and more effective solution would be to elevate the confidence of image interpretation by surgeons. As well as providing a richer and more rounded view than a descriptive report, interpretation of scan images by the surgeon is vitally important for pre-operative planning, to inform consent and for intra-operative reference where bony landmarks are shifting. Indeed, it has been reported that displaying CT images in the operating theatre is associated with a reduced risk of complications.[4]

We would propose that key structures include the lamina papyracea, skull base and anterior ethmoid arteries, and the presence of anatomical variants such as Onodi cells is significant too. As well as being the most frequent anatomical sites of complications,[5,6] injury to these structures are the most common reason the FESS surgeon finds himself or herself the subject of litigation.[7] Despite this, none of these structures were highlighted by the survey panel as being of vital importance.

Penetration of the orbital contents may result in orbital emphysema, instrumental injury to the medial rectus and diplopia. The risk is increased in the presence of pre-existing lamina papyracea dehiscence (Figure 1), and we consider it vital that this is identified by the operating surgeon.

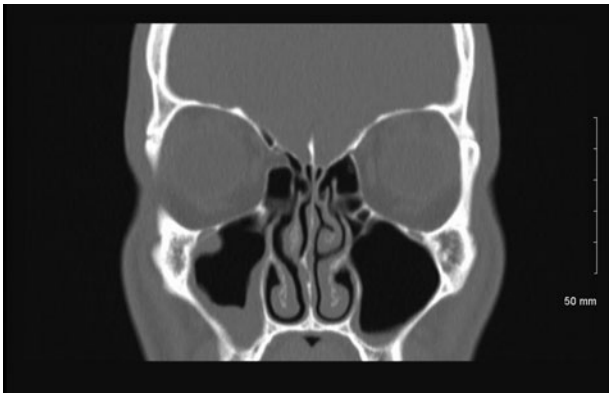

FIG. 1

Dehiscence of the lamina papyracea (shown on the right) may result in inadvertent iatrogenic injury to the orbital contents.

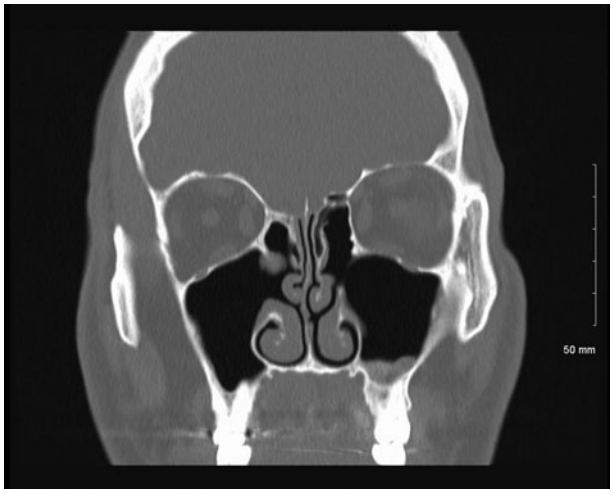

FIG. 2

Ten per cent of patients may demonstrate asymmetry of the skull base.

FIG. 3

Erosion of the skull base must be noted pre-operatively to minimise the risk of intracranial injury when operating in the presence of extensive disease (skull base and lamina papyracea erosion shown above on the right, resulting from allergic fungal rhinosinusitis).

Injury to the skull base is associated with morbidity, which may range from minor (minor pneumocephalus, self-limiting cerebrospinal fluid leak), to severe (tension pneumocephalus, meningitis, subdural haematoma or abscess), and in rare cases, mortality. High-risk regions for inadvertent injury include the entry of the anterior ethmoid artery to the skull base near the insertion of the middle turbinate, the roof of the ethmoid, and the lateral lamella of the cribriform plate.[4] The Keros classification is commonly used to describe the depth of the olfactory fossa (where the shallower fossa is relatively protected), but at particular risk are the 10 per cent of patients with an asymmetrical skull base (Figure 2).[8] Erosion of the bony skull base by disease (either benign or malignant) increases the risk of intracranial

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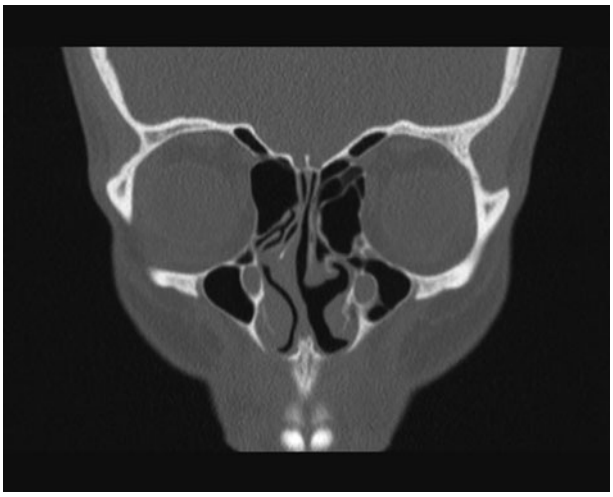

FIG. 4

The risk of injury to the anterior ethmoidal artery is increased when it emerges from the orbit (creating an indentation often referred to as Kennedy's nipple) and runs in a mesentery free of the skull base, before entering the intracranial cavity, present bilaterally in this patient.

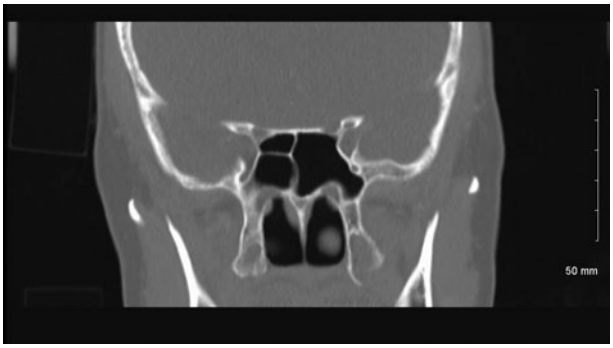

FIG. 5

A sphenoethmoidal (Onodi) cell develops laterally and/or superiorly to the sphenoid (shown here lying superiorly to the right sphenoid sinus) and may contain the optic nerve. The presence of a horizontal septation on coronal view will usually alert the surgeon to its presence.

injury, and, again, should be recognised by the surgeon (Figure 3), particularly in the setting of extensive disease. This often also indicates a need for complementary magnetic resonance imaging to better define the extent of disease.

Anterior ethmoid artery injury may cause significant intra-operative haemorrhage, but, more significantly, may result in intra-orbital haematoma and blindness. The risk of injury is increased when the vessel emerges from the orbit in its own mesentery, free of the skull base (Figure 4) or when dehiscent. Nearly half of patients may demonstrate asymmetry in the anterior ethmoid position.[9]

A sphenoethmoidal (Onodi) cell has been defined as 'a posterior ethmoidal cell which develops laterally and/or superiorly to the sphenoid sinus. The optic nerve may lie within this sphenoethmoidal cell rather than in the lateral wall of the sphenoid sinus' (Figure 5).[10] The surgeon may therefore come across the optic nerve unexpectedly in the posterior ethmoid; in particular, one should exercise caution if choosing to enter the sphenoid sinus through the posterior ethmoids instead of through its natural ostium.

In summary, we commend the call to improve the quality of CT scan interpretation, although our interpretation of 'critical areas' for interpretation would be wider ranging than those identified by the panel. In addition, it is our opinion that we as surgeons should shoulder this responsibility for scan interpretation first and foremost as part of our duty of care to patients undergoing FESS.

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Authors' reply

Dear Editors,

We would generally agree with comments made by Walker *et al*., which, firstly, relate to placing the onus upon the operating surgeon, and, secondly, consider an alternative conclusion that may be derived from the ENT-UK panel study that suggested improvement in peri-operative safety would be achieved in part by enhancing the otolaryngologist's ability to evaluate and interpret paranasal sinus computed tomography imaging.[1] When compared to the radiologist, one specific area where the surgeon will gain advantage pertains to the feedback gained from the intra-operative findings, thus enabling them to correlate clinical and radiological features in an interchangeable manner.

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