INTRAOPERATIVE CONSULTATION IN ANATOMICAL PATHOLOGY

Compiled by Dr Julian Deonarain

Intra-operative consultation (IOC) refers to the assessment of a tissue by a histopathologist and includes the process of macroscopic examination, frozen section analysis and/or cytological smear interpretation.

Frozen section (FS) is a laboratory process that describes the rapid freezing of tissue to produce a histological section/slide for diagnosis.

FS is specifically designed to guide the operative management of patients. Due to its diagnostic pitfalls, it should be reserved ONLY for patients whose immediate surgical management will be altered by the results.

ACCEPTABLE INDICATIONS:
- To establish the presence or nature of a lesion.
- To confirm that the removed tissue is diagnosable.
- To confirm the adequacy of excision margins.

How is frozen section undertaken?

A booking is made indicating the time, venue and clinical details. At FS, tissue is sampled by the surgeon and handed to the pathologist for gross appraisal and sampling (Fig 1). The tissue is orientated and rapidly frozen within a cryostat at -25 degrees Celsius (Fig 2). The tissue section stained and appraised (Fig 3). The findings are verbally reported to the surgeon. The tissue (sampled and non-sampled) is then routinely processed in the main laboratory and a formal report is generated (Fig 4). The average time to a verbal report is 20 minutes.

Potential Pitfalls in Frozen Section diagnosis

- Ice crystal formation results in tissue distortion. The difference in tissue appearance is apparent in Fig 3 and Fig 4 which both show the same tumour area.
- A limited amount of tissue is assessed during FS. For example, a lymph node reported as negative for metastatic tumour during frozen may be found to be positive for tumour once all the tissue is routinely processed.
- A large US based study showed a 98.6 concordance rate. 67.8% of discordant cases were false negatives for the following reasons: misinterpretation of features, tumour was not seen in the tissue sampled at frozen section, absence of lesion in tissue sampled at FS but present in corresponding permanent sections (usually due to tissue reorientation).

Illustrative Case – frozen section in action

A 51 year female presents with a right upper outer quadrant breast mass that has a benign clinical and radiological appearance. Pre-op fine needle aspiration cytology and tru-cut biopsies did not contribute to diagnosing the lesion. The surgeon recommended an excision of the lump, but in the absence of a definitive pre-operative diagnosis, FS was requested. The steps in this FS section are highlighted in Fig 1-4 below:

Fig 1: MACROSCOPIC ASSESSMENT: A 4x3cm firm pale irregular infiltrating tumour was noted and sampled.

Fig 2: The sampled tissue is orientated, frozen, sectioned and stained

Fig 3: The frozen section shows highly atypical cells forming solid nests.
IOC showed features of an invasive duct carcinoma – this was communicated to the surgeon and resulted in a wide local excision (with margin clearance confirmed by FS). As the patient had been counselled of this possible outcome, an ipsilateral axillary lymph node dissection was undertaken.

Fig 4: The specimen was then routinely processed which confirms the IOC findings and detailed the standard prognostic and predictive markers reported with breast carcinoma.

IOC in this instance: confirmed the diagnosis, confirmed adequacy of excision and allowed for immediate lymph node dissection avoiding another unnecessary anaesthetic.

INTRAOPERATIVE CONSULTATION (IOC) IN NEUROSURGERY

Neurosurgery is one of the more common disciplines that utilises IOC. The primary indication is to obtain a provisional diagnosis. Another important indication is confirming that the sampled tissue is representative – this is due to lesional inaccessibility, overlapping radiological features and a delicate operating field. Whilst the published accuracy of CNS FS in one institution was over 97%, 80% of discrepancies fell into the following categories:

- Spindle cell lesions (meningioma vs sarcoma vs nerve sheath tumours)
- Astrocytoma vs. oligodendroglioma
- Reactive vs. neoplastic (low grade glioma vs gliosis)
- CNS lymphoma (astrocytoma vs large cell lymphoma vs PNET)
- Tumour overgrading

Recent expert reviews state that tumour grading, margin assessment, determination of infectious agents and exact diagnosis in non-neoplastic lesions constitute unreasonable expectations.

INTRAOPERATIVE CONSULTATION IN ORTHOPAEDIC SURGERY

Hip prostheses can either be classified as septic or aseptic. Clinical and haematological investigations may indicate infection, but in cases of delayed onset septic loosening, such features (eg. ESR, CRP) may be absent. Patients with septic loosening should undergo a 2-stage revision arthroplasty and non-septic loosening is corrected with a 1 stage revision.

In cases where usual clinical parameters indicating infection are absent/equivocal, IOC may be of use in allowing to choose between a 1 stage or 2 stage revision. At FS, periprosthetic/periarticular tissue showing more than 5 neutrophils/high power field in more than 5 fields (excluding surface fibrin and exudates) is associated with septic loosening. In one case series, when correlated with culture, FS showed excellent specificity and negative predictive value for predicting septic loosening. The accuracy of IOC in this situation is naturally dependant on appropriate sampling and may be limited as not all tissue is examined at frozen section.

KEY REFERENCES: