Clinically Non-Functioning Pituitary Neuroendocrine Tumor surgery

Indications

1. tumors causing symptoms by a mass effect: visual field deficit (classically: bitemporal hemianopsia, panhypopituitarism)

2. some surgeons recommend surgery for macroadenomas that elevate the chiasm even in the absence of endocrine abnormalities or visual field deficits because of the possibility of injury to the optic nerve.

Level III: surgical resection is recommended as the primary treatment modality for symptomatic nonfunctioning pituitary neuroendocrine tumor [1)]

* there was insufficient evidence to make recommendations for asymptomatic nonfunctioning pituitary neuroendocrine tumor (NFPAs)

Surgical resection is recommended for symptomatic NFPAs (based on a large amount of class III data), as opposed to limited class III evidence that showed inconsistent benefits for: observation alone (2 studies), primary XRT (3 studies) or primary medical treatment (8 studies) for improving vision, H/ A, hypopituitarism or tumor volume [2)].

Approaches

Endoscopic transsphenoidal approach for clinically Non-Functioning Pituitary Neuroendocrine Tumor

Level III [3)] recommendations include:

● transsphenoidal surgery (microscopic or endoscopic) is recommended for relief of symptoms

● if microsurgery is used initially, endoscopic visualization afterward is recommended since it frequently reveals additional resectable tumor

● for invasive NFPAs with significant suprasellar, frontal or temporal involvement: combined transsphenoidal and transcranial surgery is recommended

● intraoperative MRI: may improve overall gross total resection; however, it is not recommended for estimating residual tumor volume because of a variable false-positive rate

✖ There was insufficient evidence to recommend

[4)]:

● neuronavigation

● introduction of intrathecal saline or air to augment the delivery of suprasellar tumor during the transsphenoidal approach

● to prevent postop CSF leak: perioperative CSF diversion, or a specific dural closure technique

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1. transsphenoidal: an extra-arachnoid approach, requires no brain retraction, no external scar (aside from where a fat graft is procured, if used). Usually the procedure of choice. Indicated for microadenomas, macroadenomas without significant extension laterally beyond the confines of the sella turcica, patients with CSF rhinorrhea, and tumors with extension into sphenoid air sinus

a) sublabial

b) trans-nares: an alotomy may be used to enlarge the exposure through thenares if necessary

2. transethmoidal approach

3. transcranial approaches:

a) indications:most pituitary tumors are operated by the transsphenoidal technique, even if there is significant suprasellar extension. However, a craniotomy may be indicated for the following:

● minimal enlargement of the sella with a large suprasellar mass, especially if the diaphragma sellae is tightly constricting the tumor (producing a “cottage loaf” tumor) and the suprasellar component is causing chiasmal compression.

● extrasellar extension into the middle fossa that is larger than the intrasellar component

● unrelated pathology may complicate a transsphenoidal approach: rare, e.g. a parasellar aneurysm

● an unusually fibrous tumor that could not be completely removed on a previous transsphenoi- dal approach

● recurrent tumor following a previous transsphenoidal resection

b) choice of approach

● subfrontal: provides access to both optic nerves. May be more difficult in patients with pre- fixed chiasm

● frontotemporal (pterional): places optic nerve and sometimes carotid artery in line of vision of tumor. There is also incomplete access to intrasellar contents. Good access for tumors with significant unilateral extrasellar extension

● ✖ subtemporal: usually not a viable choice. Poor visualization of optic nerve/chiasm and carotid. Does not allow total removal of intrasellar component

Surgery improves visual defects in the majority of patients and a lesser number will recover pituitary function. In the past, pituitary radiation was commonly administered following pituitary surgery; however the need for routine radiation has recently been reevaluated. Although tumor recurrence at 10 years post surgery may be as high as 50%, few patients with recurrence will have clinical

symptoms. Close follow-up with surveillance pituitary scans should be performed after surgery and radiation therapy reserved for patients having significant tumor recurrence [5].

The Endoscopic endonasal approach is a minimally-invasive, safe and effective procedure for the management of NFPA invading the CS. The extent of CS involvement was the main factor limiting the degree of tumor resection. The EEA was able to resolve the mass effect, preserving or restoring visual function, and obtaining adequate long-term tumor control [6].

A less experienced surgeon using a fully endoscopic technique was able to achieve outcomes similar to those of a very experienced surgeon using a microscopic technique in a cohort of patients with nonfunctioning tumors smaller than 60 cm(3). The study raises the provocative notion that certain advantages afforded by the fully endoscopic technique may impact the learning curve in pituitary surgery for nonfunctioning adenomas [7].

Post-surgical surveillance of Non-Functioning Pituitary Neuroendocrine Tumor (NFPA) is based on magnetic resonance imaging (MRI) at 3 or 6 months then 1 year. When there is no adenomatous residue, annual surveillance is recommended for 5 years and then at 7, 10 and 15 years. In case of residue or doubtful MRI, prolonged annual surveillance monitors any progression. Reintervention is indicated if complete residue resection is feasible, or for symptomatic optic pathway compression, to create a safety margin between the tumor and the optic pathways ahead of complementary radiation therapy (RT), or in case of post-RT progression. In case of residue, unless the tumor displays elevated growth potential, it is usually recommended to postpone RT until progression is manifest, as efficacy is comparable whether treatment is immediate or postponed. The efficacy of the various RT techniques in terms of tumor volume control is likewise comparable. RT-induced hypopituitarism is frequent, whatever the technique. The choice thus depends basically on residue characteristics: size, delineation, and proximity to neighboring radiation-sensitive structures. Reduced rates of vascular complications and secondary brain tumor can be hoped for with one-dose or hypofractionated stereotactic RT, but there has been insufficient follow-up to provide evidence. Somatostatin analogs and dopaminergic agonists have yet to demonstrate sufficient efficacy. Temozolomide is an option in aggressive NFPA resistant to surgery and RT [8].

References

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