Bilateral Inferior Petrosal Sinus Sampling (BIPSS) in the Diagnosis of Cushing’s Disease

The Neurosurgical point of view

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Cushing Disease

• Most patients with CS have a Pituitary corticotrophic microadenomas (< 10 mm)
• Localization of corticotropic adenomas remains a major challenge in many cases of Cushing’s disease
• Small size and imaging features similar to normal gland

Standard diagnostic workup of Cushing’s syndrome

• Clinical examination

• Biochemical studies:
  1. Serum cortisol
  2. 24 h urine cortisol
  3. low- and high-dose dexamethasone suppression tests
  4. CRH stimulating test

• Neuroimaging: Magnetic resonance (1,5-3 Tesla)

Neuroradiological Diagnosis

• Recent developments: MRI sequences that provide increased sensitivity for pituitary tumor detection
  1. spoiled gradient recalled echo (SPGR)
  2. dynamic contrast enhanced MRI, (dMRI)
  3. 3 Tesla MRI

Neuroradiological diagnosis

• limited value in the differential diagnosis of CS:
  3 reasons:
  1. low sensitivity of MRI
  2. significant incidence of pituitary asymptomatic microadenomas in the general population
  3. Possible ectopic sites

20-50% of patients with Cushing’s disease have negative MRI (Patronas et al 2003)
BIPSS

- The best diagnostic test for differentiation of ACTH Cushing’s syndrome
- Serial samples for central and peripheral plasma ACTH concentrations then are drawn at -1 and 0 minutes before and at 3, 5, and 10 minutes after the administration of desmopressin or most commonly CRH

BIPSS

- Useful for localization of microadenomas
- An intersinus ratio of 1.4 or greater would be consistent with the ipsilateral localization of a microadenoma
- The mean diagnostic accuracy of BIPSS for correct lateralization is 78% Vilar et Al (2007)

Sensitivity

- Diagnostic sensitivity and specificity for BIPSS 94%

- The main challenge in patients with Cushing disease and a negative MRI is the exploration of the pituitary to find the microadenoma
- BIPSS should at the most suggest the initial side of the gland to be explored
Surgery

- Wide sellar floor opening
- Wide dura opening
- Gland first explored on the side suggested by BIPSS test

In case of failure
Whole gland exploration

New Technique

- Endoscopic endonasal approach

New Tool

- Neuronavigator
New Tool

- Microdoppler probe

New Tool

- Ultrasound


New Tool

- Intraoperative MRI


Failure of intraoperative tumor identification

- Lack of surgical experience
- Misdiagnosis
- Very small pituitary tumor
- Corticotroph hyperplasia
- Extrapituitary parasellar adenoma


Intraoperative Neuropathologist consultation