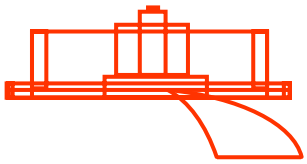
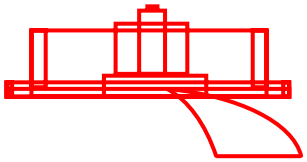


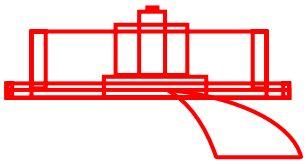
Facial nerve monitoring in vestibular schwannoma surgery

Alexis Bozorg Grayeli [1], Isabelle Bernat [1],
Michel Kalamarides [2] & Olivier Sterkers [1],
Otolaryngology (1) and Neurosurgery (2) departments, Hôpital Beaujon, Université Paris 7, France



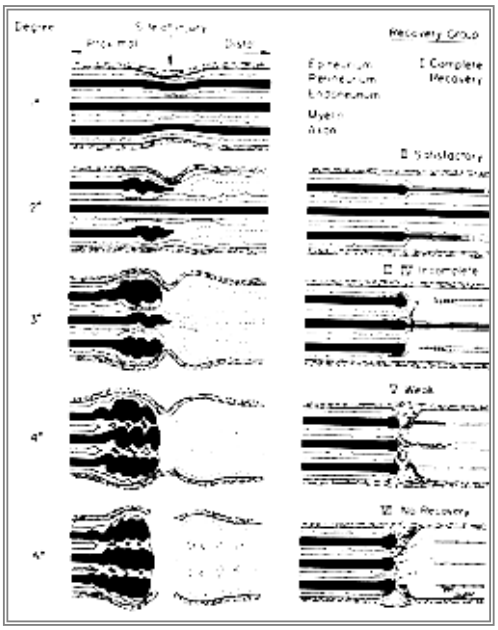
Introduction

- Intra operative monitoring of the facial nerve has become mandatory in CPA and temporal bone surgery.
- It allows the identification and the preservation of the nerve in the majority of the cases.
- Does it provide prognostic information ?



Introduction

- Inspite of integrity of the nerve sheet, dissection may lead to axonal lesions.
- Several possible mechanisms:
  - Ischemia
  - Edema
  - Inflammation
- How to identify:
  - Neurapraxis
  - Axonotmesis
  - Neurotmesis



Objective

- Evaluation of the prognostic value of a four-channel EMG device in VS surgery

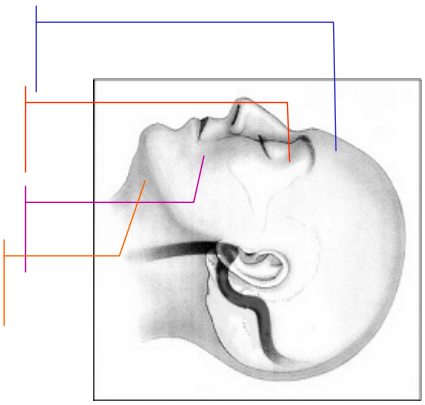
NIM response 2, Medtronic Xomed

Frontal

Orbicularis oculi

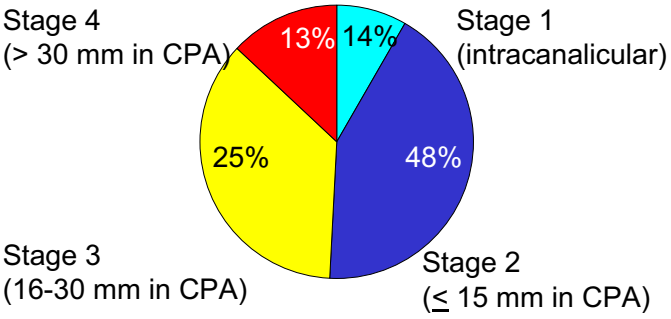
Orbicularis oris

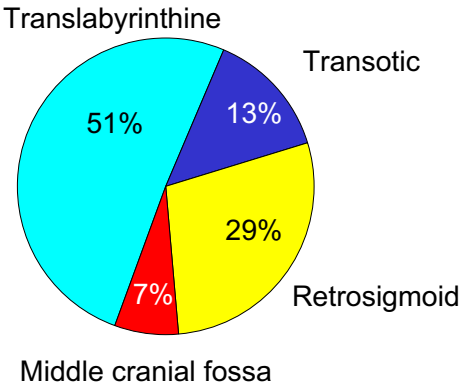
Platysma



Material and Methods (1)

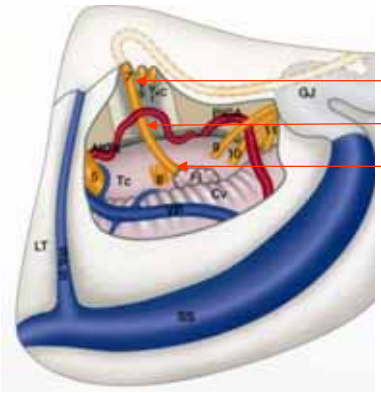
- From October 2002 to Septembre 2003, among 103 VS operated on 89 included in this prospective study
- 45 females, and 44 males (sex ratio: 1)
- Mean age: 52 years (range: 16-84)

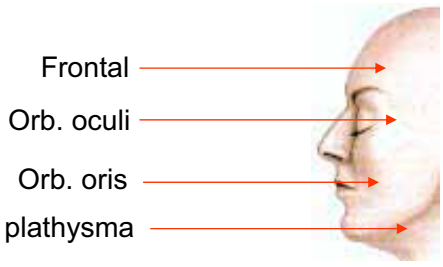




Material and Methods (2)

1. NIM responses





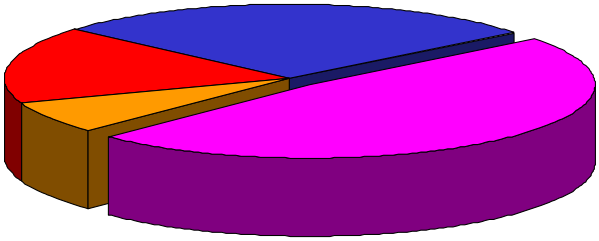
- Elicited intensity threshold > 100 µV an at least one channel
- Stimulation intensities from 0.01 to 3 mA with increments of:
  - 0.01 between 0.01 to 0.1 mA
  - 0.05 between 0.1 and 3 mA

2. Facial nerve function evlauation (House and Brackmann) at Days 1, 8, 30, and 180

Location of the maximal response

Channel 1 (frontal): 17%

Channel 2 (orbic oculi): 27%



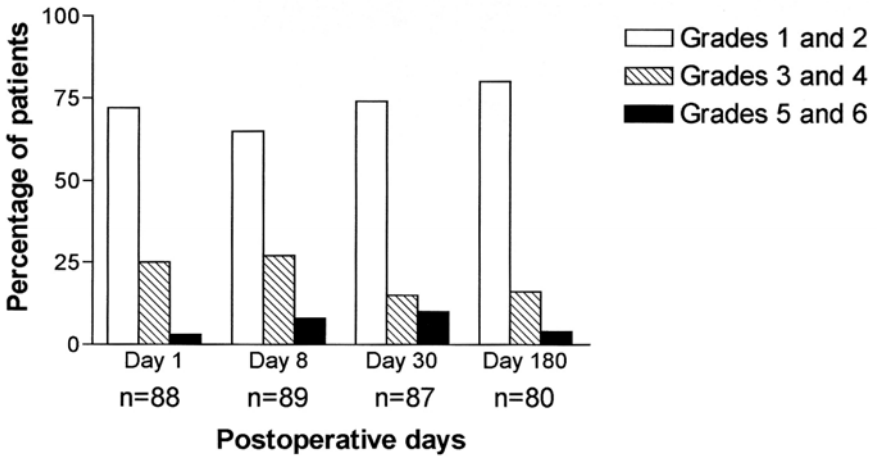
Channel 4 (plathysma): 10%

Channel 3 (orbic oris): 46%

Stimulation at brainstem at lowest intensity after tumor removal

A. Bozorg Grayeli, et al. *Otol Neurotol 2005.*

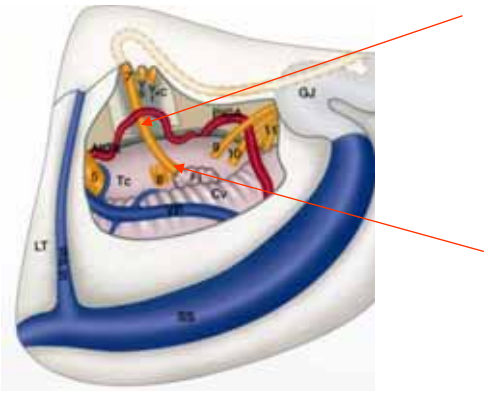
Postoperative facial function



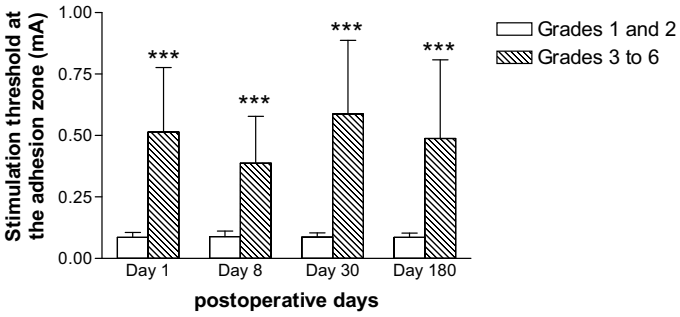
- Delayed postoperative facial paresis:
  - Between days 1 and 8: 21 cases (24%)
  - Between days 8 and 30: 2 cases of continuing deterioration and 7 new cases (10%)
  - Between days 30 and 180: 2 new cases of deterioration (3%)

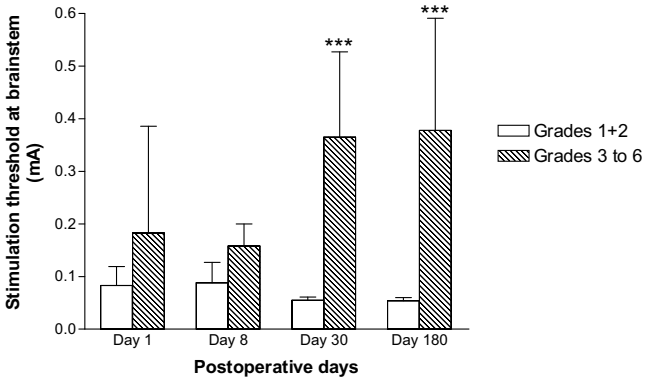
Facial function and stimulation thresholds

Stimulation threshold at the adhesion zone



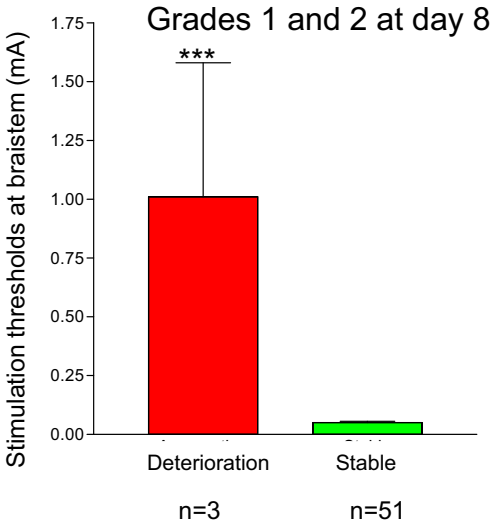
Stimulation threshold at the brainstem

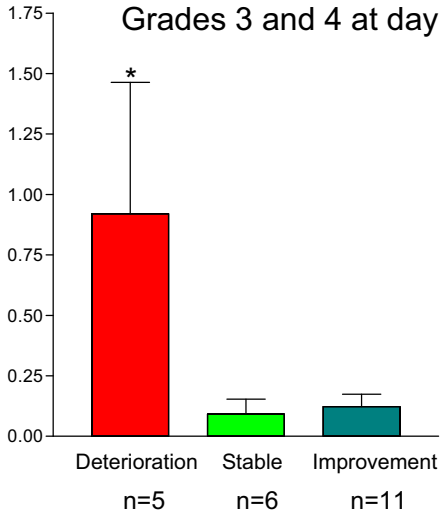




Delayed deterioration of the facial function

- No difference in brainstem thresholds in patients with stable function and those with deterioration between D1 and D8.
- Between D8 and D30:





Predictive values

	Threshold at Brainstem ≤ 0.04 mA	Proximal/distal threshold ≤ 1	Threshold adhesion zone ≤ 0.04 mA	Adhesion/distal threshold ≤ 1
n	67	64	69	67
Sensitivity	57%	53%	51%	43%
Specificity	66%	75%	66%	78%
PPV	92%	94%	91%	93%
NPV	19%	19%	17%	18%

Conclusions

- Response at minimal stimulation is maximal in frontal and plathysma regions in 27% of cases.
- A low stimulation threshold at the adhesion zone seems related to a good immediate facial outcome.
- A low stimulation threshold at the brainstem seems related to a good mid-term facial outcome.

Supramaximal stimulation and mentalis muscle recordings

Rational

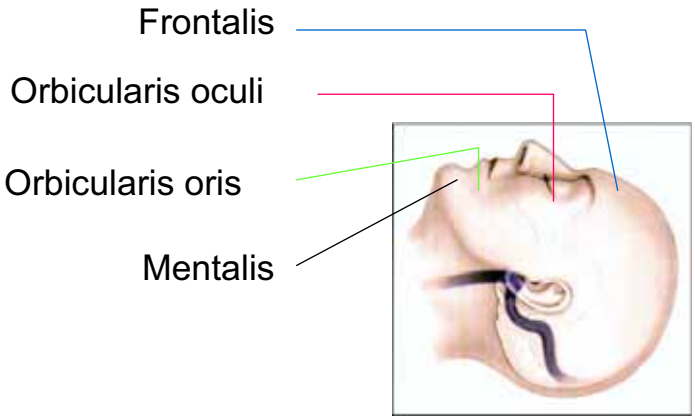
• Mentalis muscle generates high amplitude responses easier to detect than plathysma

• The amplitude of response after supramaximal stimulation is related to the number of functional axones.

Supramaximal stimulation and mentalis muscle recordings

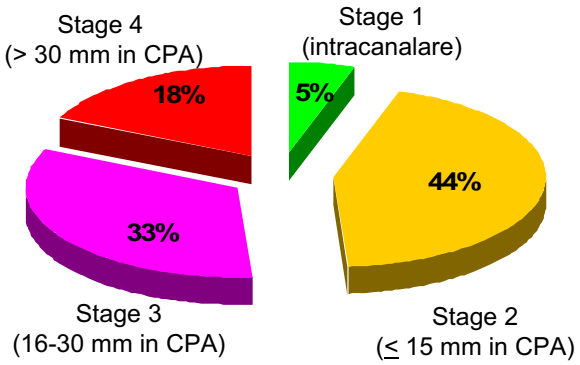
Aim

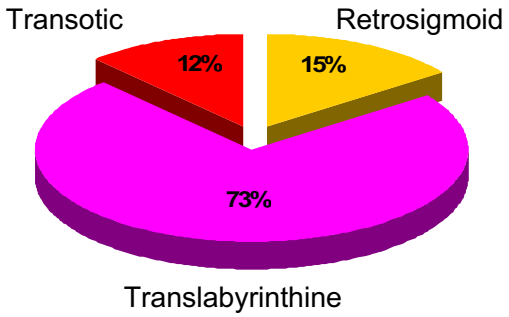
• Evaluate the mentalis muscle as one of the recording sites for intra operative monitoring
• Prognostic value of mentalis muscle recordings after supra maximal stimulation of the nerve



Population

- Nov. 2005-March 2006:
  - 57 CPA tumors included in this prospective study
  - 34 females et 23 males (sexe ratio: 0.7)
  - Mean age: 48 years (range: 16-70)



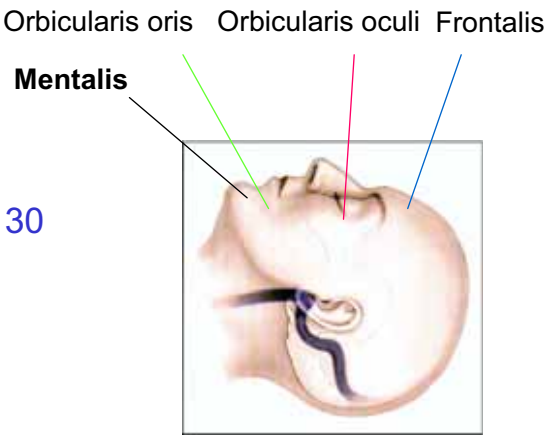


Methods

- Facial nerve stimulations
  - Before dissection at pontomedullary junction (PMJ)
  - After dissection: MAI, Tumor adhesion zone, and PMJ
  - Threshold determination: (0.01 to 0.1 mA)
  - Supramaximal intensity determination (1 to 3 mA)

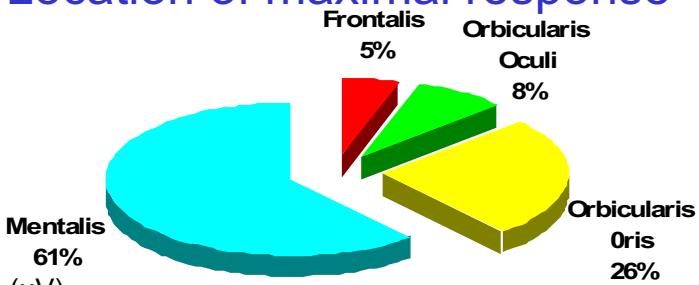
- Muscular response recordings:

- Facial function grading at days 1, 8 and 30

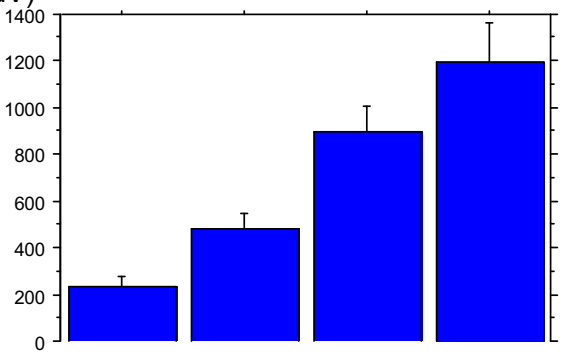


Results

Location of maximal response



Response amplitude (µV)



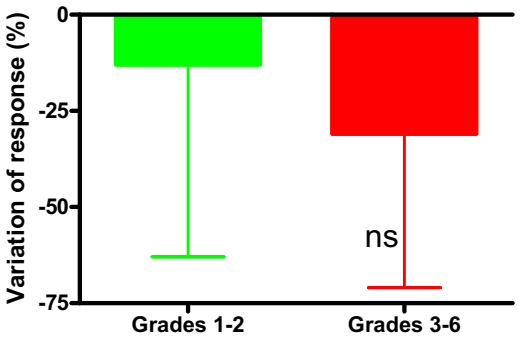
Frontalis O. oculi O. oris Mentalis

•Absolute values not correlated to facial function

Results

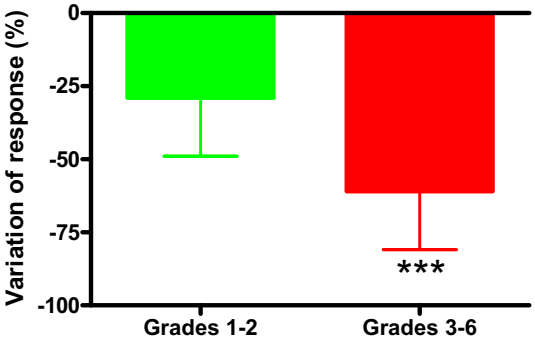
Mentalis muscle response after supramax stimulation at brainstem (2 mA)

PMJ (Before dissection- after dissection) / Before dissection



facial function at day 30

(PMJ- IAM) / IAM After dissection



facial function at day 30

*** P<0.001, test t non pairé

Conclusions

- Mentalis muscle recordings more interesting than plathysma recordings
- Mentalis response to supramaximal stimulation: Prognostic value of proximal/distal stimulation ratios
- Anatomical factors (size, adhesion, nerve position) are independent prognostic factors
- Can EMG values help to decide for a postoperative corticoid therapy ?