



# Vestibular Schwannoma: Modalities of Treatment

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# Options

- Expectant management
- Surgery
  - Retrosigmoid
  - Translabrynthine
  - Middle fossa
- Radiation therapy
  - EBRT
  - SRS/SRT
- Combined



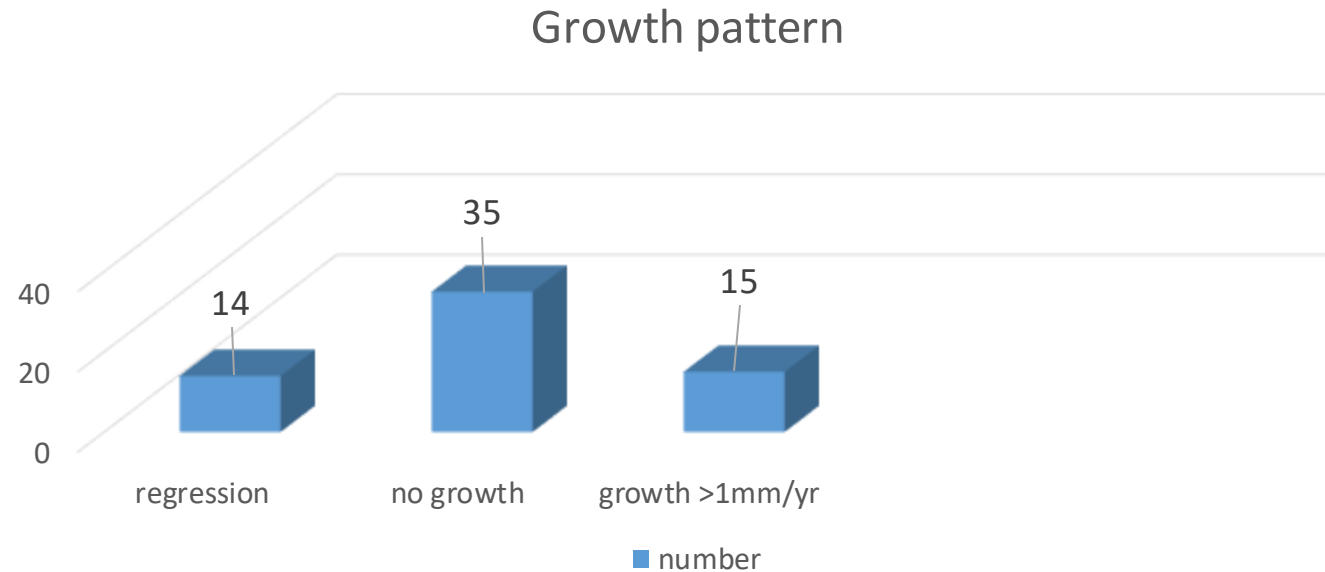
# Expectant management

- Based on natural history
- Little or no growth : 83%
- Slow growth: 2mm/yr
- Rapid growth: 10mm/yr



# Pattern of growth of vestibular schwannomas

64 patients pursued Conservative Mx and surveillance imaging



Incidence and growth pattern of vestibular schwannomas in a Danish county, 1977 - 1988  
Mirz F, Pedersen, Fitzgerald B, Lundorf E. Acta Otolaryngol 2000; 543 : 30 - 33



## Outcome of conservative management

- 68 patients, mean age 67.1years, mean f/u 3.4 years
- Growth Rate
  - 71% No growth
  - 29% Increase in size

Tumour growth rate at one year significantly higher in group with surgery : 3.00mm  
 $p < 0.0001$

‘Growth rate at 1 year follow up was a strong predictor for eventual need for treatment’

Conservative Management of Acoustic Neuroma :An Outcome Study  
Dean et al. Neurosurgery 1996. 39 : 39; 260 - 266



# Inference

- Small tumor
- Elderly/unfit
- Incidental asymptomatic
- Serial imaging : every 6 months for 2 years then yearly



# Surgery

- Salvageable hearing
  - Middle fossa
  - Retrosigmoid
- Non-salvageable hearing
  - Translabyrinthine



## Outcome of surgical treatment

- 179 Patients
  - 84% Retromastoid
  - Mean f/u 70 months
  - Complete excision 99%
- 
- Facial Nerve Function: preserved better in smaller size
  - Cochlear function better with smaller size

Acoustic Neuromas : Results of Current Surgical Management. Gormley W. Sekhar L et al. Neurosurgery 1997;41;50 – 60 Pittsburgh, Pennsylvania





- Complications

CSF Leak : 15%

2% re - explored

Death : 1% ( 2 patients )

Severe neurological disability: 1 pt



## Landmark paper in microsurgery

- 1000 VS between 1978 - 1993
- 979 tumours : complete excision
- 21 patients underwent subtotal excision
  
- Anatomical CN preservation
  - – Facial nerve : 93%
  - – Cochlear nerve : 68%

Management of 1000 Vestibular schwannomas: Surgical management and results with an emphasis on complications and how to avoid them. Samii M, Matthies C. Neurosurgery 1997;40 ; 11 - 23



# Complications

- Lower cranial nerve palsies: 5.5%
- CSF fistula: 9.2%
- Hydrocephalus: 2.3%
- Meningitis: 1.2%
- Motor paralysis: 1%



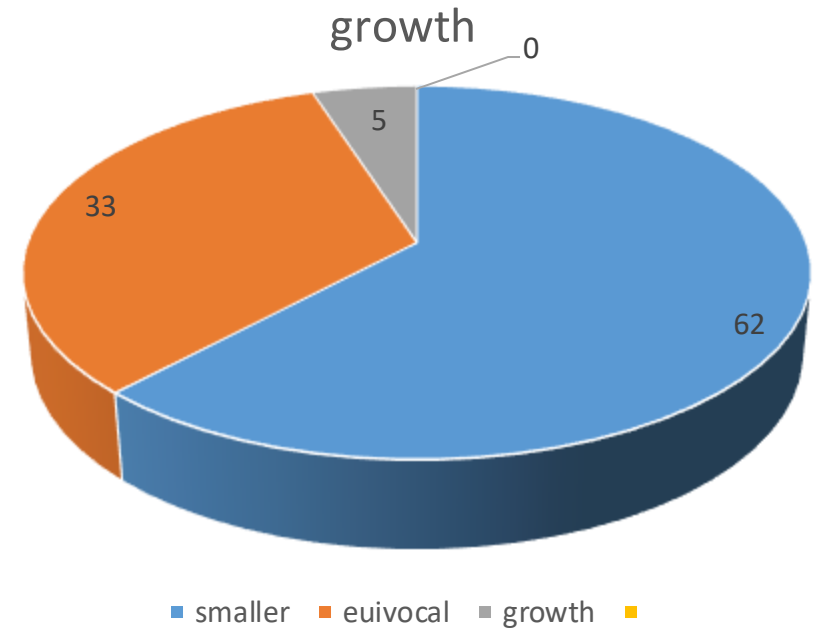
# Radiosurgery

- Enlarging small / medium tumor in elderly / unfit patient
- Recurrence after subtotal excision
- Patient preference
- Bilateral tumors in NF 2



# Long - term outcomes after stereotactic radiosurgery for acoustic neuromas

- 162 patients
- 62% became smaller, 33 % equivocal , 6% grew
- Facial function: 79% normal at 5 yrs
- Hearing: 51% had no change



Long - term outcomes after radiosurgery for acoustic neuromas

Kondziolka D, Lunsford L, McLaughlin M, Flickinger J. N Engl J Med 1998;339:1426 – 33



## Fractionated stereotactic radiotherapy

150 pt f/u > 1 yr

FRS schedules:

< 3.0 cm : 25Gy total ( 5 doses ) - 131 pt

3.0 - 3.9 cm : 30 Gy total ( 10 doses ) - 18 pt

4.0 cm : 40 Gy total ( 2 doses ) - 2 pt

Hearing preservation the same for small and large tumors

Tumor regression : 14 % ( 25Gy regimen ), 15% ( 30 Gy ), 8% ( 40 Gy )

‘ FSR may preserve normal function and control both small and large acoustic neuromas ’

Fractionated stereotactic radiotherapy for acoustic neuromas  
Williams J. Acta Neurochir. 2002 : 144 ; 1249 - 1454



# Radiosurgery : Results

- Tumour control ( No growth ) 92 – 98%
- Volume reduction 23 – 55%
- Hearing preservation 30 – 46%
  - Hearing loss related to tumour size
  - No loss if tumour < 1.0cm
- Facial nerve palsy 1.3 – 4.2%
  - Usually transient with 66% improving in 1 year
- Trigeminal neuropathy 4 – 30%
- Hydrocephalus 4%



## Gamma knife surgery VS microsurgery

- Prospective study ; 97 gamma knife, 110 microsurgery

Outcome	GKS	MS
Facial nerve preservation	100%	63%
Hearing preservation	70%	37.5%
Functional deterioration	9%	39%
Mean hospital stay	3 days	23 days

‘ Functional side effects occur during 1st 2 years after GKS. Findings after 4 years of follow up indicated that GKS provide better functional outcomes than MS in this patient series’

Functional outcome after gamma knife surgery or microsurgery for vestibular schwannomas Regis et al. J. Neurosurg.2002:97; 1091 – 1100 Marseille, France





## Gamma knife surgery VS microsurgery

- GKS : 91; microsurgery: 26
- Nonrandomized prospective
- Average size 25mm
- Better facial nerve sparing and hearing preservation with GKS at 2 years follow up

Vestibular schwannoma: surgery or gamma knife radiosurgery? A prospective, nonrandomized study. Myrseth E1, Møller P, Pedersen PH, Lund-Johansen M; Neurosurgery 2009



## Combined approach

- 32 patients between 2010 and 2016
- Planned subtotal resection followed by GKR
- Normal facial function and higher cochlear nerve function retained
- Further long term follow up needed

Preserving normal facial nerve function and improving hearing outcome in large vestibular schwannomas with a combined approach: planned subtotal resection followed by gamma knife radiosurgery  
Daniel ST, George M et al, Acta neurochirurgica 2017, 159(7)



# Medical treatment

- Bevacizumab
- No conclusive study yet



# Evidence Based : Conclusions

- A number of schwannomas involute or do not exhibit growth
- Surgery can achieve total tumor removal in about 97%
- Radiosurgery can 'control' tumor growth in the short term
- Functional preservation may be better with radiosurgery
- No systematic study compares different modalities of treatment



- Thank you