Journal Reading

Prevelence of High Jugular Bulb across different stages of adulthood in a chinese populaiton.

Jingjing Wang1, 2, 3, Yanmei Feng1, 2, 3, Hui Wang1, 2, 3, Chunyan Li1, 2, 3, Yaqin Wu1, 2, 3, Haibo Shi1, 2, 3, Shankai Yin1, 2, 3, *, Zhengnong Chen1, 2, 3, *(2020).Aging and disease.Volume 11, Number 4; 770-776. DOI: 10.14336/AD.2020.0215

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Presenter：陽明Clerk2 朱庭萱

指導老師：洪偉誠 醫師

- Case
- Introduction
- Methods
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case

B08053,71-year-old Female,ADL-dependent

- [Underlying]
  1.Fungemia, suspected Permcath related blood stream infection
  2.Right pleural effusion, transudate
  3.AV dissociation, third degree AVB s/p TPM on 12/21
  4.ESKD under HD qw135 via Permcath at 廣泉
- [History]
  Otitis media with effusion history,s/p operation twice before.
- [此次入院]
  Fever after HD on 2024/12/20 morning
- **12/26: left ear progressive hearing impairment with tinnitus, bilateral eardrum intact, bilateral retracted**

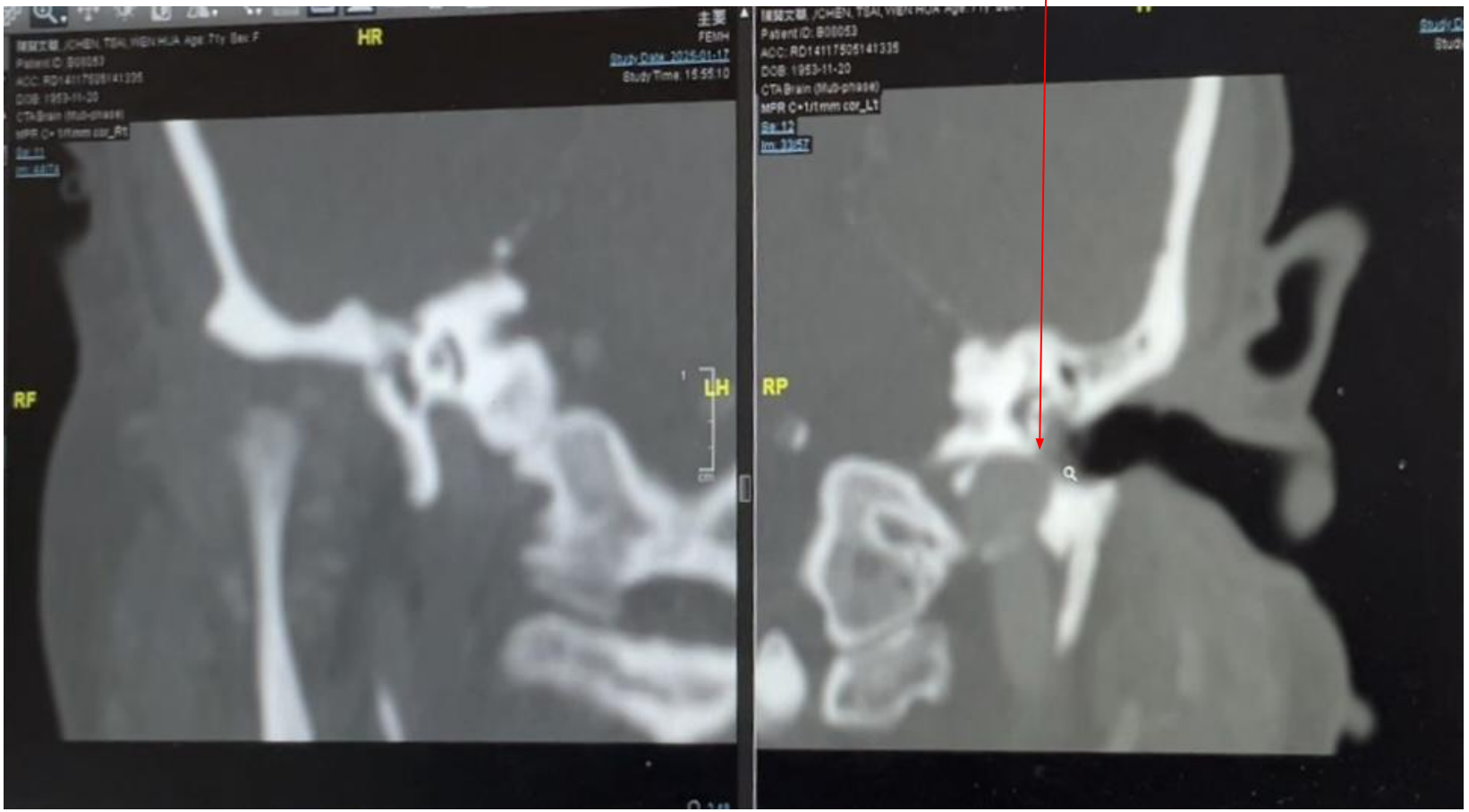
case

- 12/26: suspect left otits media with effusion, s/p antibiotic ,Hiros, Avamys
- 1/11 : consulted again, suggest myringotomy.
- 1/14 :
  - left myringotomy.
  - left eardrum hemotympanum

    -s/p earwick packing and Foley tube compression

    No massive bleeding after that
- 1/17:
  - removed earwick packing
  - arranged brain CIA to survey it mid-ear AVM.
- 1/20: choking event with respiratory distress. sign DNR without medication
- 1/22:
  - NG tube inserted smoothly under Nasopharyngoscope

    (some bloody crust and mucopus in left nasal cavity,)
- 1/31 passed away


HR
RF
LH
RP

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Original Article

Prevalence of High Jugular Bulb across Different Stages of Adulthood in A Chinese Population

Jingjing Wang[1,2,3,#], Yanmei Feng[1,2,3,#], Hui Wang[1,2,3], Chunyan Li[1,2,3], Yaqin Wu[1,2,3], Haibo Shi[1,2,3], Shankai Yin[1,2,3,*], Zhengnong Chen[1,2,3,*]

[1]Department of Otolaryngology-Head and Neck Surgery, Shanghai Jiao Tong University Affiliated Sixth People's Hospital, Shanghai 200233, China
[2]Otolaryngology Institute of Shanghai Jiao Tong University, Shanghai 200233, China
[3]Shanghai Key Laboratory of Sleep Disordered Breathing, Shanghai 200233, China

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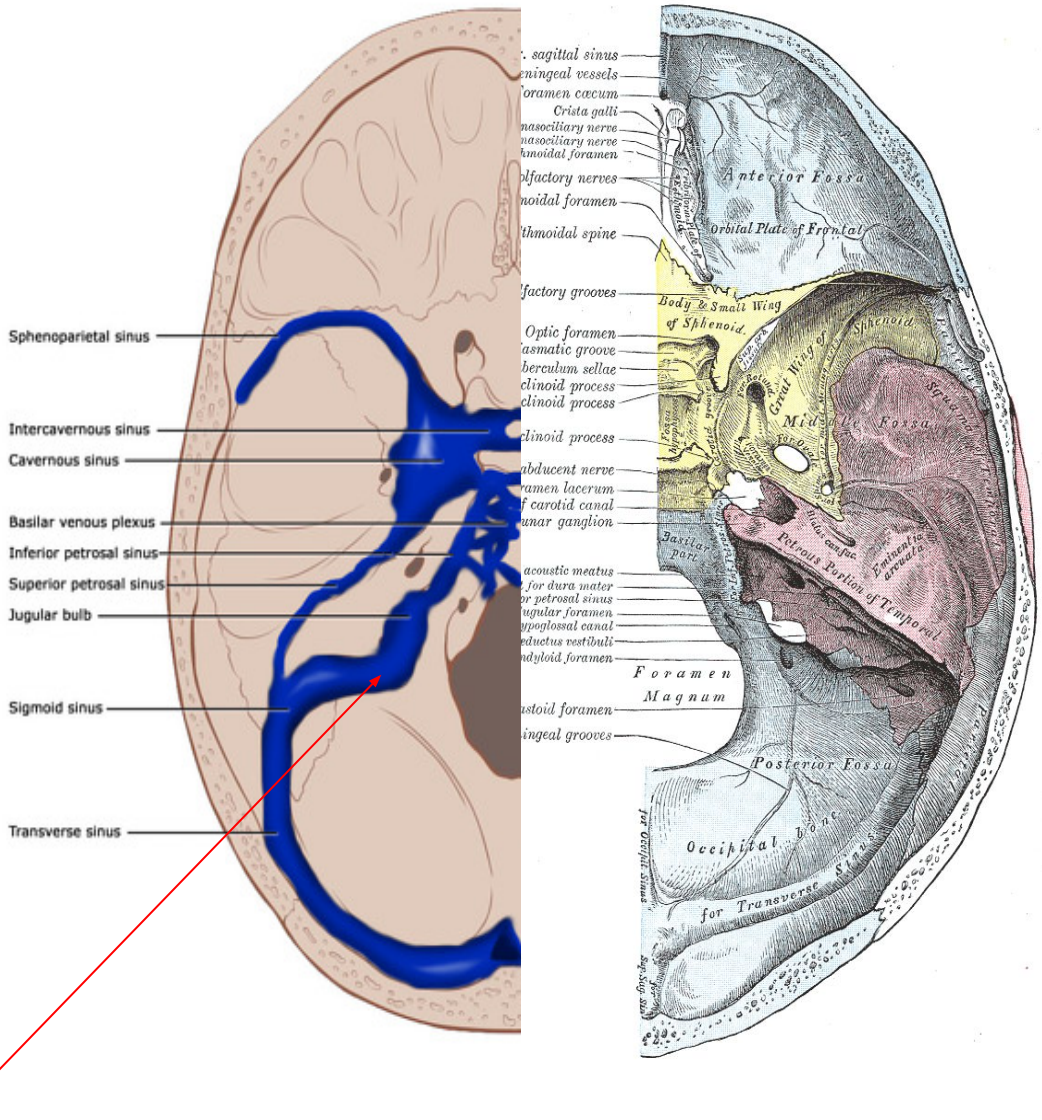
Introduction

Jugular bulb (JB)

- dimensions : 15 mm wide × 10-20
- Right jugular bulb is slightly larger
- Dome of JB extends more superior
  temporal bone.
- more anterior the sigmoid sinus, is,
  dome lies.

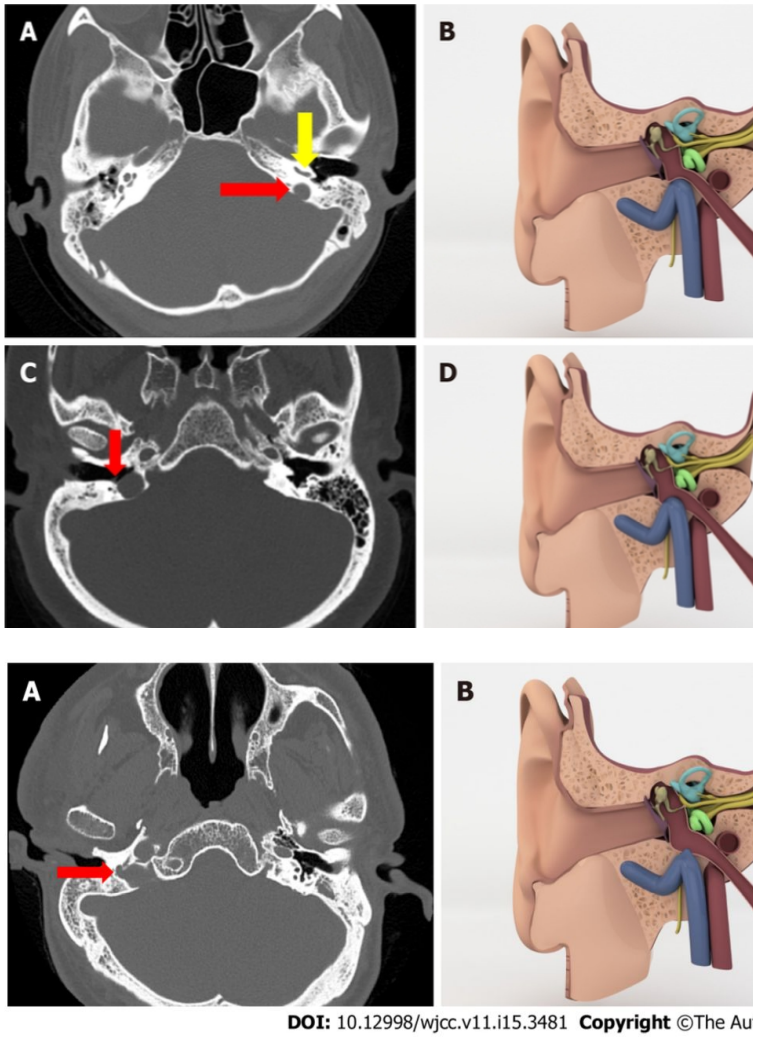


Complications of Surgery for Chronic Otitis Media .Otologic Surgery, 20, 217-230

Introduction

- Anatomy vary,abnormalities:
  - High jugular bulb(HJB): most common
  - Jugular bulb dehiscence
  - Jugular bulb diverticulum

- Exposed jugular bulb: prone to injury
- Thin vessel wall
- No dura cover
- Missing heavy adventitial layer



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Symptom

- Silent presentation
- Pulsatile tinnitus
- Ear fullness
- Conductive hearing disorders
  - round window, pars tensa, ossicular chain
- Sensorineural hearing disorders
  - vestibulocochlear nerve, internal auditory canal, inner ear
- Vertigo,vestibular dysfunctions :
  - HJB preventing the vestibular aqueduct from reabsorbing endolymph, causes Meniere's disease

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Methods-Participants

- Aim:

  Epidemiological characteristics of the high jugular bulb (HJB) at different stages of adulthood and analyzes its prevalence in a Chinese adult population.

- Enrolled **4539** Permanent residents (9078 ears) from two communities in the Shanghai region who underwent magnetic resonance imaging between 2007 and 2011.

Methods-Participants

- Divided into four subgroups according to age:
  - 35-44 (early middle age),
  - 45-54 (middle age),
  - 55-64 (late middle age),
  - 65-75 (late adulthood)
- Exclusion criteria included:
  - Cochlear implants, otitis media implanted pacemakers, intraocular metal foreign bodies, inner ear implants, metal prostheses
  - early pregnancy, claustrophobia,failure to comply with the study protocol.

Methods-Data Collection

- **High-resolution MRI (3.0 T)** was used to detect HJB.
- **Cross-sectional area of the jugular bulb (JB)** was measured using the formula: Area=π×A×B
- where A and B are half of the major and minor axes of the ellipse, respectively.
- respectively;
- A = (1/2)* (anteroposterior measurement)
- B = (1/2)* (mediolateral measurement)

Methods-Data Collection

Table 1. Study participant characteristics.

Characteristics	Total (N=4539)	Normal jugular bulb (normal JB, n=3883)	High jugular bulb (HJB, n=656)	P value*
Mean age (SD), y	55.5 (10.1)	55.6 (10.1)	54.6 (10.1)	0.027*
Female/Male, n/n	2395/2144	2005/1878	390/266	<0.001*
Mean body mass index (SD), kg/m^2	23.6 (3.0)	23.7 (3.0)	23.5 (3.1)	0.049*
Smoking, n (%)$^+$	981 (21.6%)	859 (22.1%)	122 (18.6%)	0.043*
Alcohol use, n (%)$^\#$	569 (12.5%)	492 (12.7%)	77 (11.7%)	0.505
Hypertension, n (%)	1147 (25.3%)	999 (25.7%)	148 (22.6%)	0.084
Diabetes, n (%)	329 (7.2%)	278 (7.2%)	51 (7.8%)	0.574
Hyperlipidemia, n (%)	357 (7.9%)	311 (8.0%)	46 (7.0%)	0.380
Stroke, n (%)	134 (3.0%)	116 (3.0%)	18 (2.7%)	0.733
Coronary heart disease, n (%)	96 (2.1%)	87 (2.2%)	9 (1.4%)	0.153
Myocardial infarction, n (%)	16 (0.4%)	15 (0.4%)	1 (0.2%)	0.563
Arrhythmia, n (%)	84 (1.9%)	75 (1.9%)	9 (1.4%)	0.325

* $p < 0.05$, comparisons between normal JB and HJB. $^+$ Smoked >100 cigarettes in a lifetime. $^\#$ Consumption of > 30g of alcohol per week for longer than 1 year.
SD = standard deviation.

Methods-Statistical analyses

- SPSS 20.0 statistical software (version 20 for Windows; IBM Corp., Armonk, NY) to analyse all data.
- P-values < 0.05 were considered statistically significant
- The prevalence of HJB and changes in JB size across different age groups were compared.

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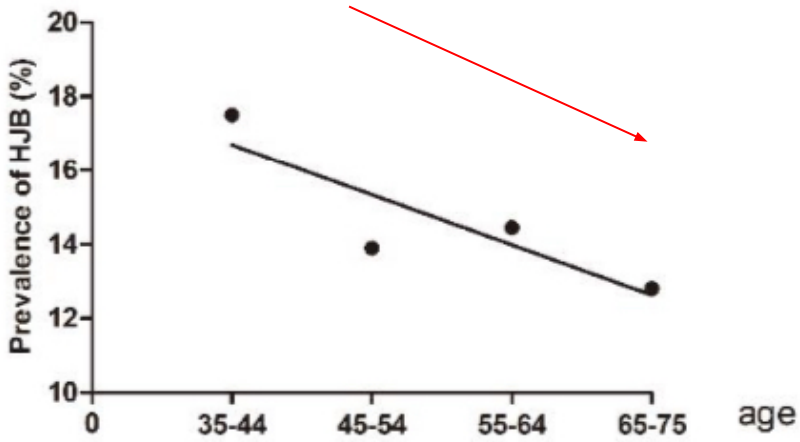
Result

- Overall prevalence in healthy Chinese population of HJB:
  1. Among 4,539 participants, overall prevalence of HJB:14.5% (656/4,539).
  2. bilateral HJB in 82 (1.8%):
     - participants; 20 (24.4%) men and 62 (75.6%) women.
  3. Right-sided HJB (10.0%) was more common (6.2%) ($p < 0.001$).
  4. Women (16.3%) had higher prevalence than men (12.4%) ($p < 0.001$).
  5. Smoking, alcohol consumption, hypertension, and diabetes were not significantly related to HJB prevalence.

Result

- Age and HJB Prevalence
  - HJB prevalence decreased with age (p = 0.039).
  - Prevalence in different age groups:
    - 35–44 years: 17.6%
    - 45–54 years: 13.9%
    - 55–64 years: 14.5%
    - 65–75 years: 12.8%



  - aged <60 years (14.8%).(439/2964),)
  - aged ≥60 years (13.8%)((217/1575))

Result

- Changes in Jugular Bulb Size
  - Jugular Bulb Size: Right> Left
  - The left JB size decreased significantly with age ($p < 0.001$).
  - The right JB size showed no clear trend ($p = 0.312$).

Table 2. Age- and sex-specific area of the JB [normal jugular bulb (normal JB) + high jugular bulb (HJB)].

Age (yrs)	Men			P_1	Women			P_2	All			P_3
	Participants (N)	Area (mm^2) Left	Area (mm^2) Right		Participants (N)	Area (mm^2) Left	Area (mm^2) Right		Participants (N)	Area (mm^2) Left	Area (mm^2) Right	
35-44	384	47.6 (23.2)	59.7 (30.0)	<0.001	385	47.3 (27.9)	57.6 (31.8)	<0.001	769	47.4(25.7)	58.6(30.9)	<0.001
45-54	686	47.8 (25.6)	59.4 (31.3)	<0.001	858	44.9 (25.1)	55.7 (30.3)	<0.001	1544	46.2(25.4)	57.3(30.8)	<0.001
55-64	577	45.9 (26.7)	62.3 (33.6)	<0.001	668	43.2 (25.1)	57.3 (31.3)	<0.001	1245	44.5(25.9)	59.6(32.5)	<0.001
65-75	497	42.4 (25.4)	56.4 (29.5)	<0.001	484	42.7 (26.1)	56.2 (31.4)	<0.001	981	42.5(25.7)	56.3(30.5)	<0.001
Total	2144	46.0 (25.5)	59.5 (31.3)	<0.001	2395	44.3 (25.8)	56.6 (31.1)	<0.001	4539	45.1(25.7)	58.0(31.2)	<0.001

P_1: comparison of lateralised areas of JB in men across age groups. P_2: comparison of lateralised areas of JB in women across age groups.
P_3: comparison of lateralised areas of JB across all age groups.

Result

- Changes in Jugular Bulb Size
  - HJB had a significantly larger average area (65.2 mm²) than normal JB (49.2 mm², $p < 0.001$).

Table 3. Age- and sex-specific area of different JB types [normal jugular bulb (normal JB) or high jugular bulb (HJB)].

Age (yrs)	Men				P_1	Women				P_2	All				P_3
	Normal JB		HJB			Normal JB		HJB			Normal JB		HJB		
	Ears (n)	Area (mm²)	Ears (n)	Area (mm²)		Ears (n)	Area (mm²)	Ears (n)	Area (mm²)		Ears (n)	Area (mm²)	Ears (n)	Area (mm²)	
35-44	652	52.0 (25.4)	116	62.6 (36.2)	0.013	616	49.8 (28.6)	154	62.9 (34.6)	<0.001	1268	51.0 (27.0)	270	62.8 (35.2)	<0.001
45-54	1210	52.0 (27.9)	162	65.8 (34.7)	<0.001	1448	47.6 (26.5)	268	64.8 (33.1)	<0.001	2658	49.6 (27.2)	430	65.2 (33.7)	<0.001
55-64	1018	52.2 (29.1)	136	68.8 (42.4)	<0.001	1112	47.2 (27.0)	224	65.1 (35.0)	<0.001	2130	49.6 (28.1)	360	66.5 (37.9)	<0.001
65-75	876	47.5 (27.0)	118	63.6 (34.0)	<0.001	834	46.5 (26.9)	134	68.0 (38.0)	<0.001	1710	47.0 (27.0)	252	65.9 (36.2)	<0.001
Total	3756	51.0 (27.7)	532	65.4 (36.9)	<0.001	4010	47.6 (27.1)	780	65.1 (34.8)	<0.001	7766	49.2 (27.4)	1312	65.2 (35.7)	<0.001

P_1: comparison of normal JB and HJB areas in men across age groups. P_2: comparison of normal JB and HJB areas in women across age groups.
P_3: comparison of normal JB and HJB areas in all participants across all age groups.

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Discussion

- Comparison with Previous Studies
  - Our study overall prevalence of HJB:14.5%
  - Reported HJB prevalence varies widely from 2.8% to 65%:
    - Definitions of HJB
    - Study methodologies (CT vs. MRI)
    - Study populations (healthy vs. symptomatic patients)

  - JB stabilizes after age 40:

    - Our study:Left JB continued to decrease in size
      - HJB prevalence declined with age.
    - Bone resorption and decreased mastoid pneumatization.

Discussion

- Higher Prevalence in Right Ear larger:
  - Longer left brachiocephalic vein, which alters venous pressure.
  - Asynchronous embryonic venous sinus development, resulting in stronge right-sided venous flow.

- Factors Affecting HJB Prevalence:
  - Younger age and female sex were significantly associated with increased HJB prevalence ($p < 0.001$).

Discussion

- Clinical Implications
  - Middle ear and skull base surgery:
    - Reducing surgical exposure, affecting the translabyrinthine approach.
    - Risk of hemorrhage and air embolism
  - Ménière's disease :
    - Impairing endolymph absorption in the vestibular aqueduct, leading to fluid imbalance.

Conclusion

- HJB prevalence in healthy Chinese adults is 14.5%.
- Prevalence decreases with age,
- More common in women and the right ear,
- Pulsatile tinnitus, ear fullness, vertigo, hearing disorders, vestibular dysfunction requiring further investigation.

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Bleeding management

- Occlude with bone wax or Gelfoam
- Control larger lacerations
  - packing Surgicel between the bony defect and the bulb.
- Ligate the internal jugular vein in the neck
  - obliterate the bulb and distal sigmoid sinus with Surgicel.
- Risk: Air embolism (rare)
  - Flooded with irrigation
  - Placed in Trendelenburg position(head down)

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Bleeding management

- Transcatheter Endovascular Embolization
  - Guglielmi Detachable Coil (GDC)
  - rocedure: A microcatheter > femoral vein > internal jugular vein.
  - Outcome:

    block blood flow in a high jugular bulb.

    avoiding **damage to ossicular chain** and **tympanic membrane**.

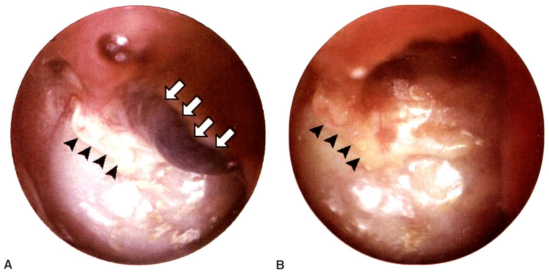


Fig 1. Left tympanic membrane under microscope. **A)** At first visit. Tympanic membrane was severely depressed and adherent to promontory. Malleus handle (arrowheads) resembled relief carving through tympanic membrane. Dark-purple jugular bulb could also be observed at posterosuperior part of tympanic cavity. Arrows — high jugular bulb. **B)** After embolization. With coil embolization of jugular bulb, blood flow from sigmoid sinus into jugular bulb was completely eliminated, so that protrusion of jugular bulb at posterosuperior part of tympanic cavity disappeared. Arrowheads — malleus handle.

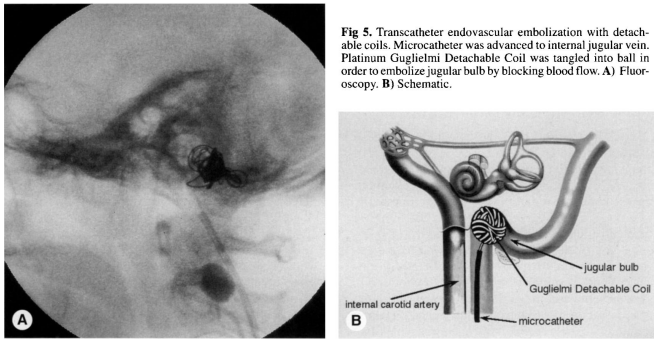


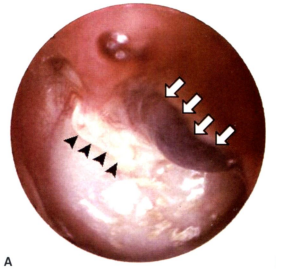
Fig 5. Transcatheter endovascular embolization with detachable coils. Microcatheter was advanced to internal jugular vein. Platinum Guglielmi Detachable Coil was tangled into ball in order to embolize jugular bulb by blocking blood flow. **A)** Fluoroscopy. **B)** Schematic.

Kondoh et al(2004), Hemorrhagic High Jugular Bulb in Only Hearing Ear,2004

Management

- **71-year-old,Female**
- **left ear progressive hearing impairment with tinnitus**
- **bilateral eardrum intact, bilateral retracted**

- History- taking:
  - assess hearing loss
  - venous tinnitus (characteristically pulsatile, particularly on exerti
- Abnormal otoscopic findings:
  - a visible mass in the ear canal
  - blue discolouration behind the tympanic membrane
- Pre-operative CT scans
- Silent presentation



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Thanks for your listening!