

## 한국인의 이소골 계측

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### Measurement of Korean Ossicles

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#### ABSTRACT

**Background and Objectives** : There are several factors affecting the result of the ossiculoplasty such as the severity of the pathology, the operating technique and the reconstruction material, etc. So far, most of the ossicular materials that have been developed were not perfect and some of the commercialized materials are not suitable for Koreans. We investigated the dimensions of the Korean ossicles and the space between the handle of the malleus and the plane of the stapes in order to standardize the artificial ossicles to fit Koreans. **Materials and Methods** : Sixteen cadaveric Korean temporal bones which did not have any pathology of tympanic membrane and ossicles were used for this study. We dissected the temporal bones and measured the related dimensions of ossicles under a surgical microscope. **Results** : The dimensions of the part of ossicles are as follows : (1) length (mm), 1) malleus head  $3.46 \pm 0.57$ , neck  $0.91 \pm 0.17$ , handle  $4.40 \pm 0.29$  ; 2) incus short process  $2.42 \pm 0.35$ , long process  $3.31 \pm 0.57$  ; 3) stapes head and neck  $0.79 \pm 0.19$ , height of crura  $2.24 \pm 0.34$  ; (2) diameter (long, short) (mm), stapes head  $0.95 \pm 0.20$ ,  $0.73 \pm 0.11$ , footplate  $2.91 \pm 0.20$ ,  $1.38 \pm 0.16$ . The distance between the stapes head and the malleus handle was  $3 \pm 0.3$  mm, and between the stapes footplate and the malleus handle  $5.1 \pm 0.4$  mm. The angle between a line from the malleus handle to the head of stapes and a perpendicular line of stapes footplate passing the center of stapes head was  $29 \pm 7$  degree. The angle between a line from the malleus handle to the stapes footplate and a perpendicular line of stapes footplate passing the center of stapes head was  $17 \pm 5$  degree. **Conclusion** : We collected normal data of dimensions of the Korean ossicles from cadaveric temporal bones. The differences in the dimensions between ossicles of the Korean and the non-Koreans were observed. The observed data from this study should be useful in the development of the artificial ossicular materials suitable for the Koreans. (**Korean J Otolaryngol 1998;41 (7):994-998**)

**KEY WORDS** : Korean · Measurement · Malleus · Incus · Stapes.

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55 ( 23 75 )] 20  
4 16

가

0.5 mm

(Fig. 1).

X  
X  
(Fig. 2).  
X  
(A)  
(B)  
(B')  
(B+B')

(C)  
(C')

C가 ( ) tangent  
(A/B), C' ( ) tangent{A/(B+B')}

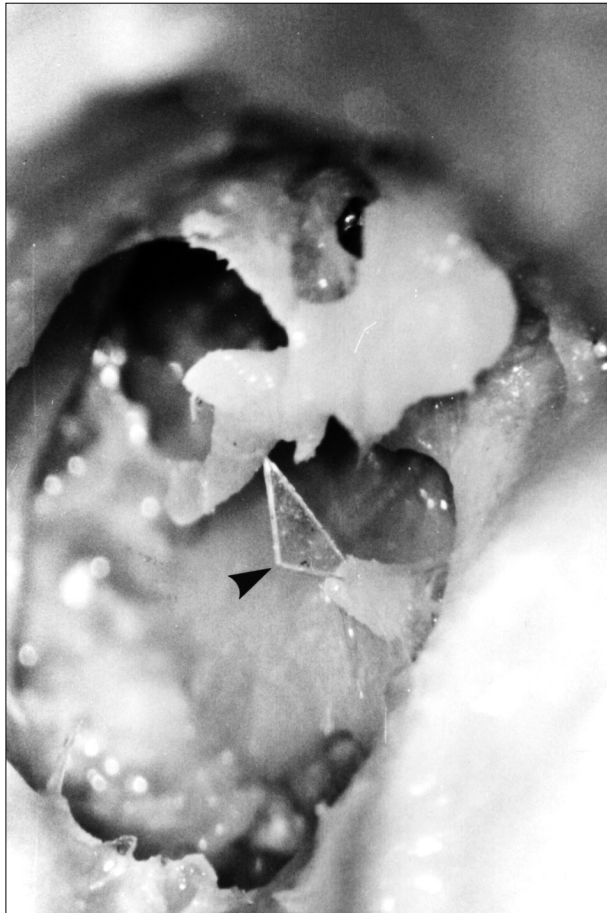


Fig. 1. A triangled measure (arrow) between the medial part of malleus handle and the top of stapes head.

(Fig. 2).

0.05 mm

0.5

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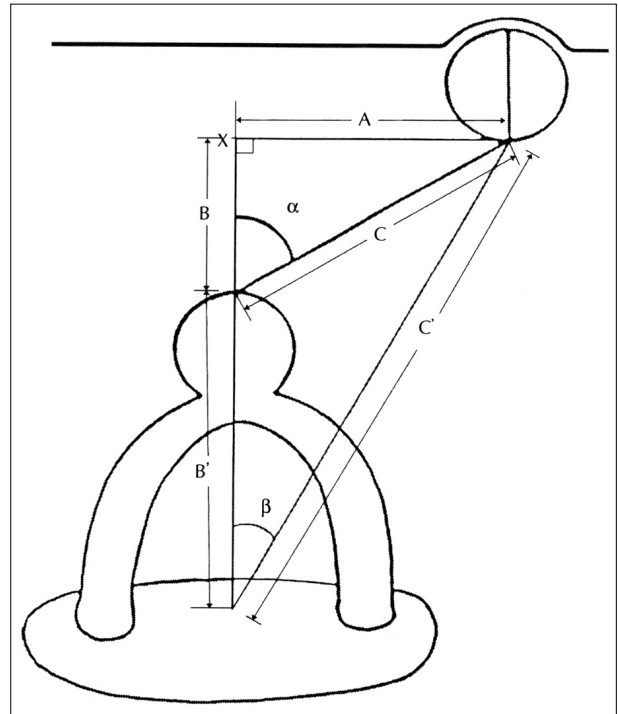


Fig. 2. Schema of measurement method of distance and angle between the malleus handle and stapes.

X : the point intersected by the line drawn parallel to the stapes footplate passing the medial part of malleus handle and the perpendicular line of stapes footplate passing the center of stapes head

A : distance between the point X and the medial part of malleus handle

B : distance between the point X and the top of stapes head  
B' : distance between the top of stapes head and the footplate

C : distance between the top of stapes head and the medial part of malleus handle

C' : distance between the stapes footplate and the medial part of malleus handle

a : angle between a line C and a perpendicular line of stapes footplate passing the center of stapes head

b : angle between a line C' and a perpendicular line of stapes footplate passing the center of stapes head

**Table 1.** Results of ossicular measurements (length) (n=16)

Ossicles	Length (Mean ± SD) (mm)
Malleus :	
head	3.46 ± 0.57
neck	0.91 ± 0.17
short process	1.03 ± 0.26
handle	4.40 ± 0.29
Incus :	
body – short*	3.02 ± 0.41
long†	3.64 ± 0.31
short process	2.42 ± 0.35
long process	3.31 ± 0.57
lenticular process	0.54 ± 0.15
Stapes :	
head & neck	0.79 ± 0.19
height of crus	2.24 ± 0.34
footplate – AP	2.91 ± 0.20
SI	1.38 ± 0.16

short\* : length to short process, long† : length to long process  
 AP : length from anterior to posterior direction  
 SI : length from superior to inferior direction

**Table 2.** Results of ossicular measurements (diameter) (n=16)

Ossicles	Diameter (Mean ± SD) (mm)
Malleus :	
head – ML	2.43 ± 0.25
AP	2.42 ± 0.30
neck – AP	1.54 ± 0.35
ML	0.91 ± 0.21
handle – ML	0.93 ± 0.11
AP	0.62 ± 0.07
Incus :	
body – AP	3.67 ± 0.16
ML	2.09 ± 0.26
short process – ASPI	1.58 ± 0.26
ML	0.98 ± 0.13
long process – ML	1.02 ± 0.18
AP	0.81 ± 0.11
lenticular process	0.71 ± 0.18
Stapes :	
head – AP	0.95 ± 0.20
SI	0.73 ± 0.11
neck – AP	0.83 ± 0.17
SI	0.55 ± 0.15
anterior crus – SI	0.33 ± 0.12
AP	0.29 ± 0.07
posterior crus – SI	0.38 ± 0.11
AP	0.33 ± 0.12
footplate thickness	
anterior	0.38 ± 0.10
middle	0.31 ± 0.11
posterior	0.50 ± 0.11

ML : diameter from medial to lateral direction  
 AP : diameter from anterior to posterior direction  
 ASPI : diameter from anterosuperior to posteroinferior direction  
 SI : diameter from superior to inferior direction

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 (C) 3.0 mm( 0.3 mm)  
 5.1 mm( 0.4 mm)  
 7 ) C가 ( ) 29 ( )  
 5 ) (Fig. 2).  
 (Table 1)  
 (impedance transformer)  
 , , 8.77 mm

6.95 mm  
 2.91 mm,  
 1.38 mm 3.15 mm<sup>2</sup>  
 (Table 2)  
 가  
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 (p<0.05).  
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 가 (p<0.05)(Table 4).

(lever ratio)

. Wengen <sup>8)</sup>

1.14 mm,

0.83 mm,

1.18 mm,

0.64 mm

1)4)5)

가

2)

가

가

2)3)6)7)

가

가

가

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(impedance transformer)

10

16

( 3.0 mm)

( 5.1 mm)

3.0 mm

5.1 mm

(superstructure of stapes)

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29

29

Mills<sup>2)</sup>

( 49 ,

17

14 71 )

8.77 mm

6.95 mm

1.26 : 1

2.91 mm,

1.38 mm

3.15 mm<sup>2</sup>

1.26 : 1

가

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(HMP - 95 - G - 2 - 31)

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