Anatomic morphometry of the coracoid process and lateral clavicle for the management of glenoid bone loss : A-3D analysis in Korean population

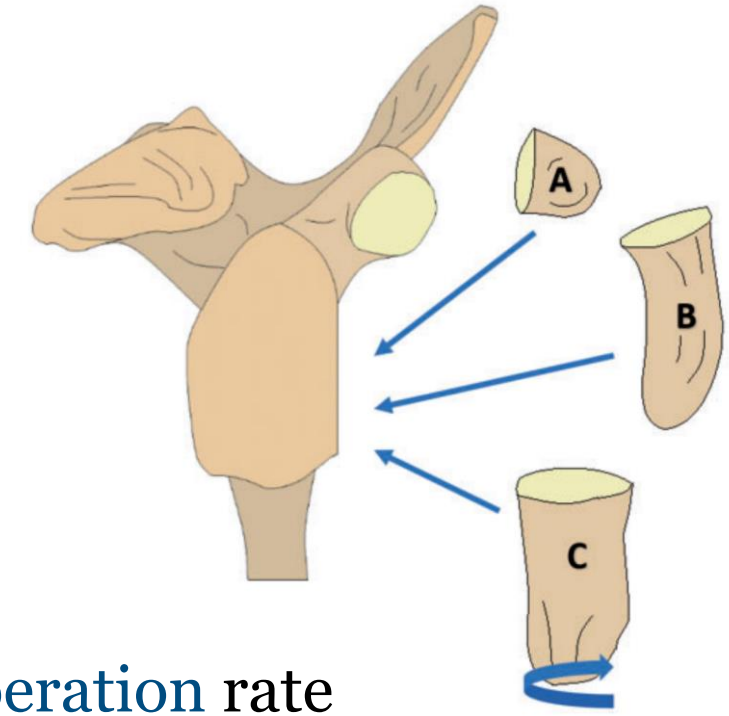
Du-Han Kim, **Chul-Hyun Cho, Gu-Hee Jung***

Keimyung University Dongsan Hospital

Gyeongsang National University Changwon hospital*

Introduction

- Anterior shoulder instability in patients with bone defect
  - ➢ Glenoid reconstruction using autologous or allograft
  - ➢ **Latarjet procedure**

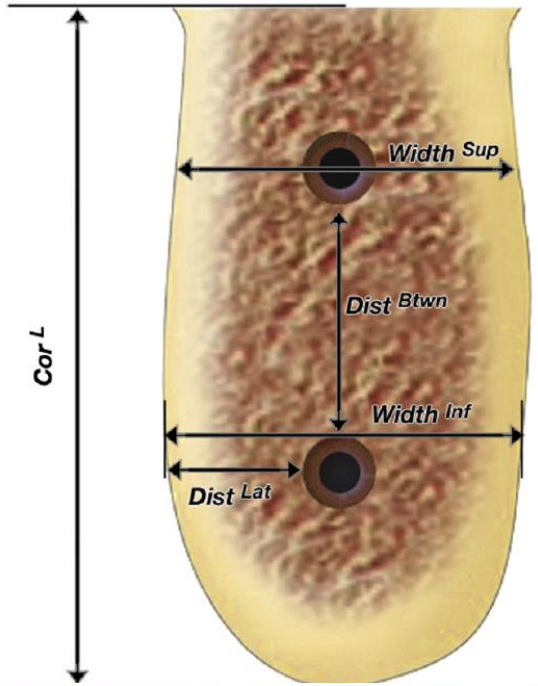


- Latarjet procedure : 16.1% overall complication & 2.6% reoperation rate
  - ➢ Among them, coracoid fracture is the most frustrating complication.
  - ➢ A proper sizing of the coracoid process is the important factor.

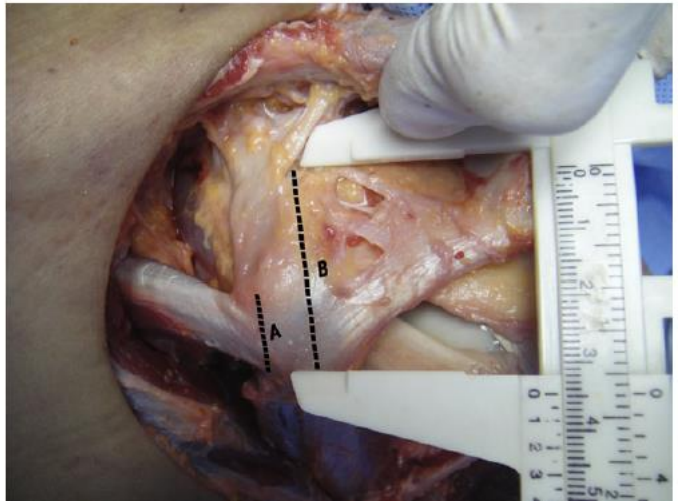
Zhang et al, Shou & Elb, 2021
Cho et al. AJSM 2023

Coracoid process

the safety margin for the Latarjet



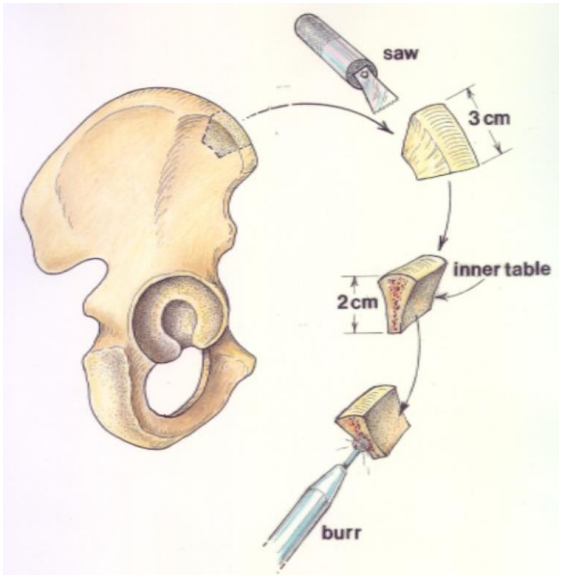
- the morphology of the coracoid show differences in shape size and angle in various papulation.



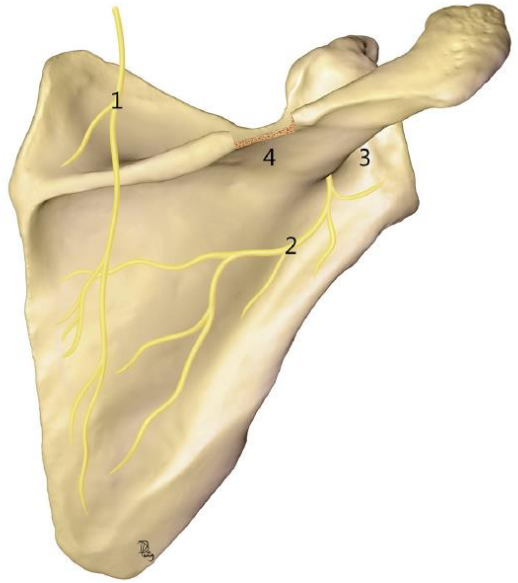
- Especially, Asians tend to have smaller coracoids compared to Caucasians

Terra et al, Arthroscopy, 2013
Young et al. JSES, 2013

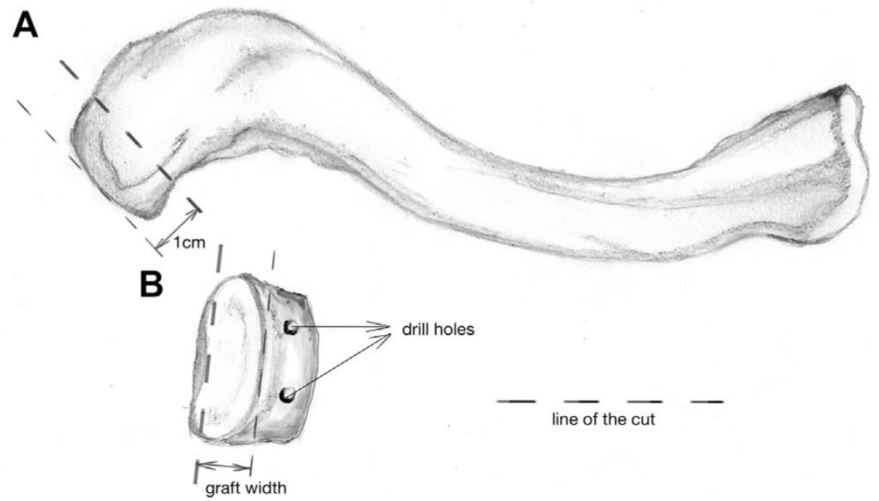
Autologous bone grafts for glenoid defect



Iliac crest bone



Scapular spine



Distal clavicle

- Recently, the distal clavicle has been described as a locally available osteoarticular graft with a broader radius to restore glenoid bone loss.

Purpose

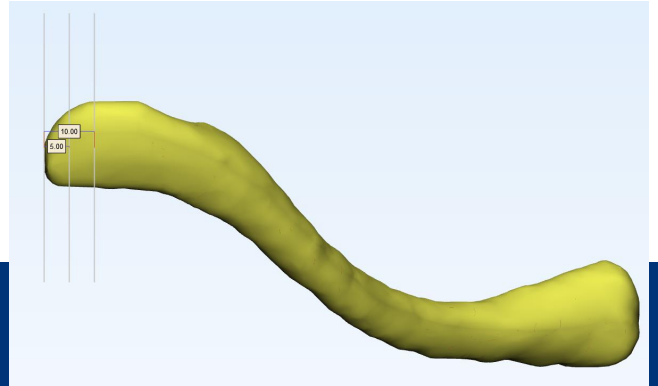
- To evaluate anatomic morphometry of the coracoid and distal clavicle in the Korean populations.

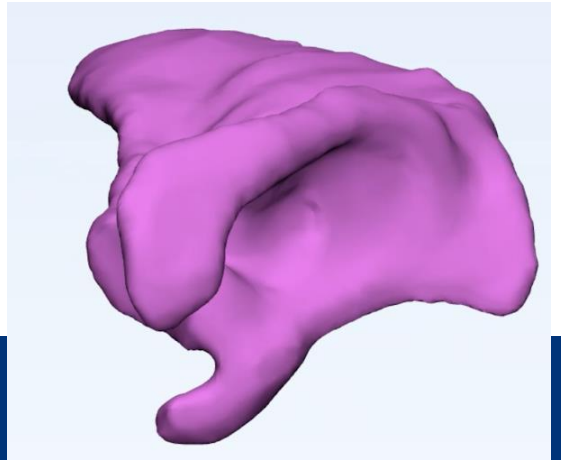
- We hypothesized that our measurements would be smaller than previous studies of Western populations.

Materials and Methods

- digital data of cadavers were acquired from Korean Institute of Science and Technology Information (→ Gyeongsang university hospital)

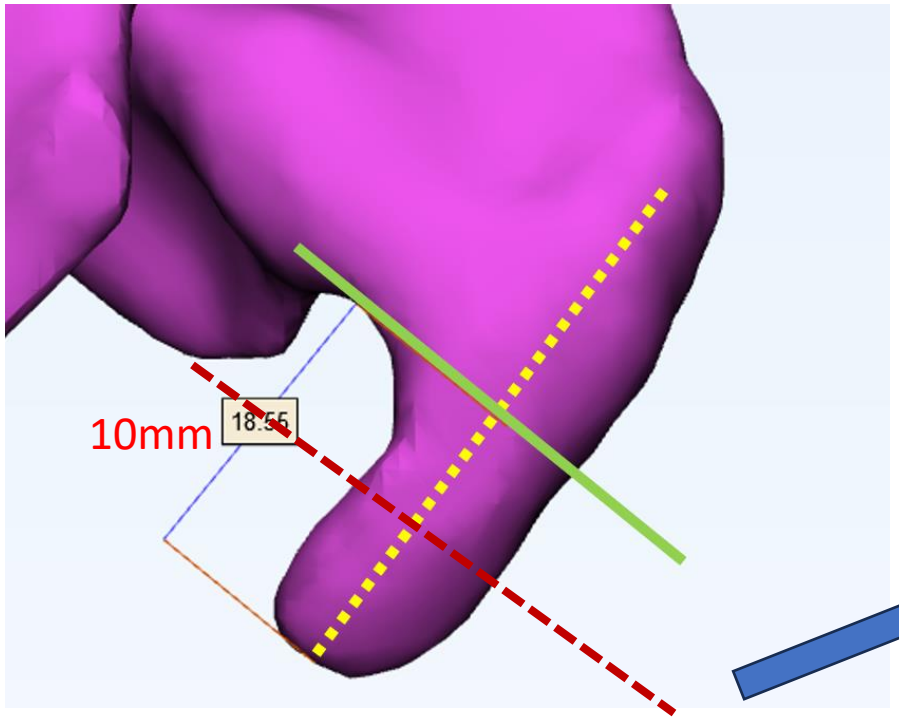
- 3D-CT Scans: adult cadavers who underwent continuous 1.0 mm slice in supine position.



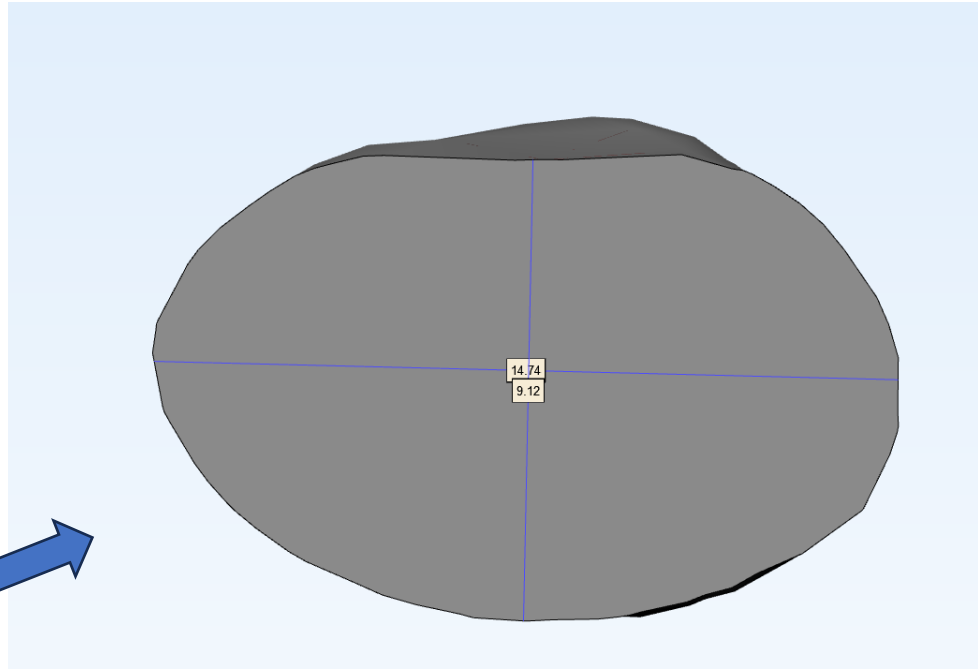


Materials and Methods

- Five bony parameters of coracoid process & clavicle



1. Coracoid Length

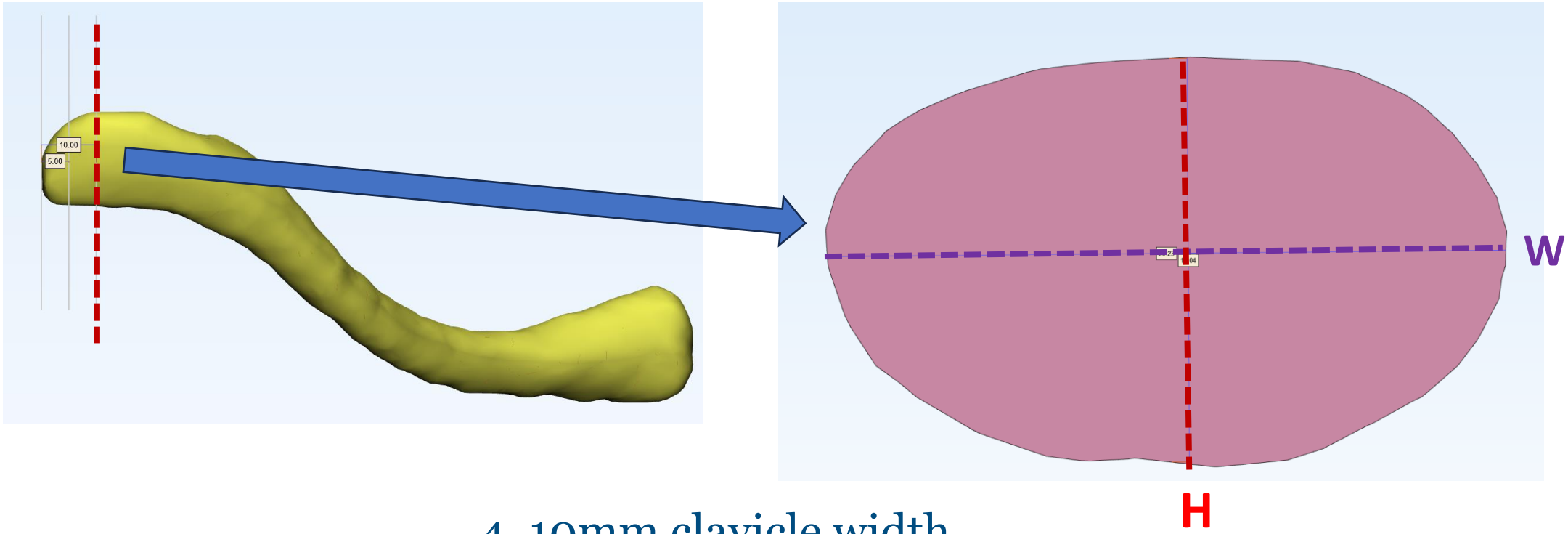


2. Coracoid process width

3. coracoid process height

Materials and Methods

- Five bony parameters of coracoid process



4. 10mm clavicle width

5. 10mm clavicle height

Results – demographic data (N= 66)

	Total (66)	Male (32)	Female (34)	*P* value
Age [year]	53.1±8.0	51.1±9.5	55.1±5.9	0.044
Height [cm]	159.9±7.2	164.2±6.4	155.8±5.2	<0.001
Coronoid Length [mm]	19.2±2.0	20.3±1.9	18.1±1.5	<0.001
Coronoid width [mm]	15.5±1.7	16.3±1.7	14.8±1.5	<0.001
Coronoid height [mm]	11.5±1.6	12.2±1.4	10.8±1.4	<0.001
Clavicle width [mm]	22.1±3.7	24.4±3.6	19.9±2.3	<0.001
Clavicle height [mm]	12.0±1.8	13.0±1.7	11.1±1.4	<0.001

*Statistically significant

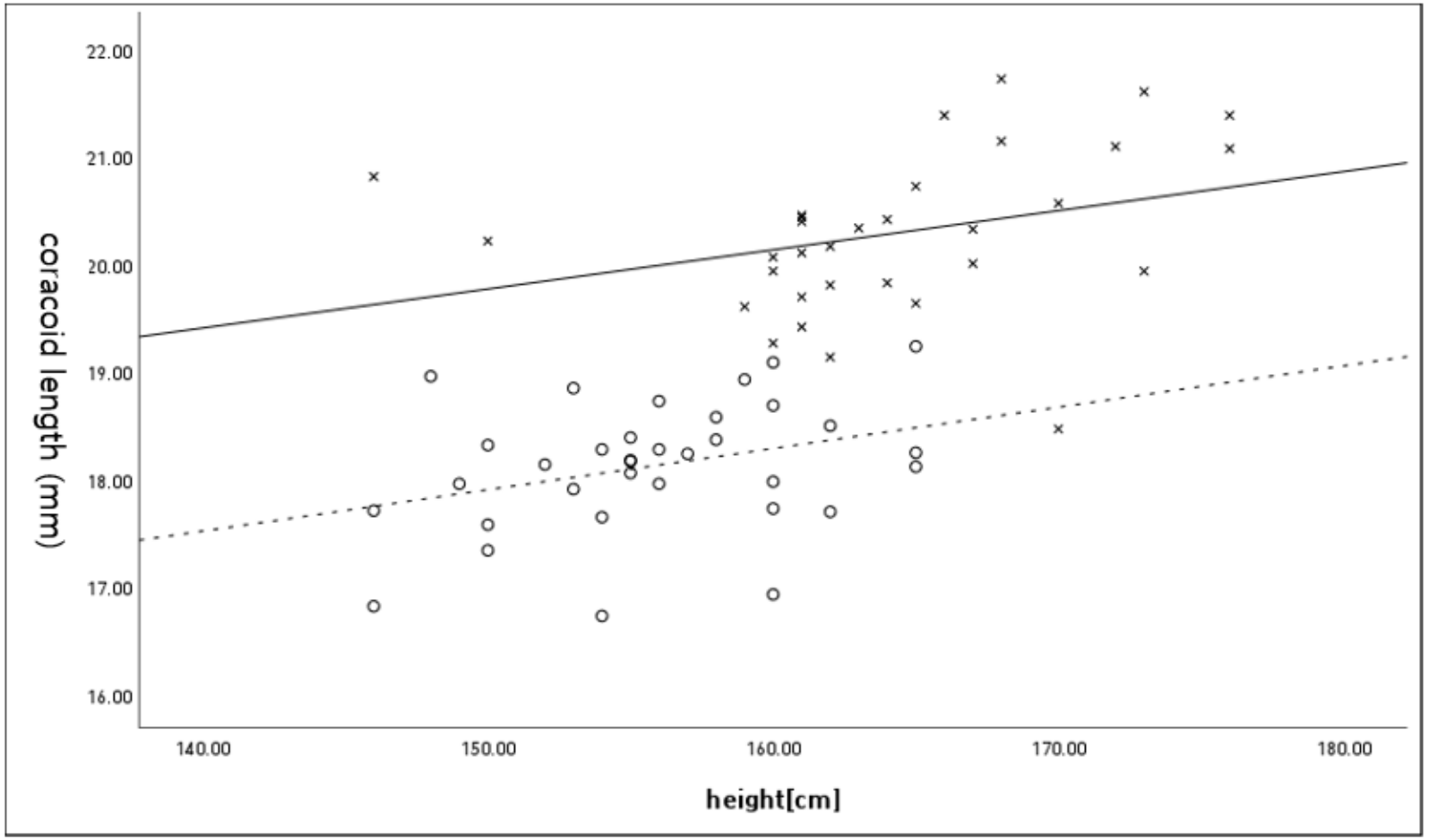
Results –Pearson correlation analysis

	Height	Coronoid Length	Coronoid height	Coronoid width	Clavicle width	Clavicle height
Height	-	0.418**	0.385**	0.386**	0.557**	0.415**
Coronoid Length	0.418**	-	0.467**	0.371**	0.385**	0.393**
Coronoid height	0.385**	0.467**	-	0.692**	0.317**	0.345**
Coronoid width	0.386**	0.371**	0.692**	-	0.267*	0.177
Clavicle width	0.557**	0.385**	0.317**	0.267*	-	0.684**
Clavicle height	0.415**	0.393**	0.345**	0.177	0.684**	-

*. Correlation is significant at the 0.05 level.

**. Correlation is significant at the 0.01 level (2-tailed).

Results – Regression model estimate



Coracoid length (in mm) = 11.70 + (0.041 * height) + 1.86 (the last number is added for men)

Width of 10 mm point of clavicle = 0.16 x height + 3.176 (the last number is added for men).

Discussion

	Country	Coracoid Length (mm)	Coracoid width (mm)	Coracoid Height (mm)	*Measuring technique*
Our study	South Korea	19.16±2.02	15.52±1.72	11.47±1.55	3D CT
Dolan et al.	American	28.5±5.1	16.1±2.3	13.5±1.6	Cadaver
du Plessis et al.	South Africa	22.0	15.8	12.4	2D CT
Jia et al.	Chinese	20.08±2.02	14.59±2.07	11.12±1.97	3D CT
Bhatia et al.	South Africa	19.0	14.2	-	Cadaver
Imma et al.	Malaysia	20.98±2.90	13.86±1.76	9.24±1.16	3D CT
Lian et al.	Mongolian	24.75±7.23	15.29±1.7	11.61±1.98	Cadaver
Terra et al.	Brazil	33.3±3.8	21.1±2.0	14.9±1.2	Cadaver

Conclusion

- The morphologies of coracoid process and the distal clavicle showed significant correlation with gender and height.
- The coracoid length tends to be smaller in Asians than Caucasians.
- Distal clavicle might be a suitable option for the Asian female population.

계명대학교
동산병원
KEIMYUNG UNIVERSITY
DONGSAN HOSPITAL

Thanks for your attention!!