

Morphometry of Scapular Acromion Process Pattern in Vidarbha Region

Ujwal Gajbe¹, Brij Raj Singh², Nandkishor Bankar³

¹Professor & HOD Dept. of Anatomy, Datta Meghe Medical College, Hingna, Nagpur, Shalinitai Meghe Hospital and research Centre (Datta Meghe Institute of Medical Sciences) Hingana, Nagpur-441110, ²Professor & HOD Dept. of Anatomy, Datta Meghe Medical College, Hingna, Nagpur, Shalinitai Meghe Hospital and research Centre (Datta Meghe Institute of Medical Sciences) Hingana, Nagpur-441110, ³Assistant Professor Dept. of Microbiology Jawaharlal Nehru Medical College (Datta Meghe Institute of Medical Sciences) Sawangi Wardha-442001

Abstract

Introduction: The shoulder joint is the most important joint although most commonly dislocated joint in human body. The most common problem of shoulder joint replacements is the osteoarthritis, post-traumatic arthritis, rotator cuff tear arthropathy, rheumatoid arthritis, avascular necrosis (osteonecrosis) and comminuted fractures of the shoulder joint. The aim of the current study was to acquire morphometric data for the acromion process variations in shape and various dimensions of the acromion process of the scapula.

Material and Method: Total 152 subjects' scapula according to their side which was equally divided into 76 right and 76 left. The morphometric analysis of the acromion process of scapulae was recorded according as per Bigliani-Morrison et al. classification and dimensions were measured by using vernier callipers.

Observation and Results: It is observed that the mean length of acromion on either side does not differ significantly, while the mean width of acromion and its mean thickness if found to differ statistically significantly on both sides. The acromio-coracoid distance shows no significant difference on either side.

Discussion: There are many studies i.e. by the Singroha R et al (north India), Gosavi et al (Maharashtra), Singh et al (Rajasthan), Mansur et al (Nepalese), Paraskevas et al (Greek) revealed that the mean of the scapular length, width, thickness and coraco-acromial distance in centimeter found almost the same in correspondingly with our study.

Conclusion: To conclude acromion process knowledge are useful for orthopaedic surgeon during surgery of shoulder joint with associated pathology of the rotator cuff.

Keywords: Scapula, acromion process, shoulder joint, Morphometry.

Introduction

The shoulder joint is the most important joint

Corresponding Author:

Dr. Brij Raj Singh

Professor & HOD Dept. of Anatomy, Datta Meghe Medical College, Hingna, Nagpur, Shalinitai Meghe Hospital and research Centre (Datta Meghe Institute of Medical Sciences) Hingana, Nagpur-441110
e-mail: drbrijsing@gmail.com

although most commonly dislocated joint in human body. It has a acromion process, that projects almost at right angles from the lateral end of the spine of the scapula. Coraco-acromial ligament extends between the tip of the acromion and the coracoid process, forming a Coraco-acromial arch. The space below the arch gives way to the tendons of muscles forming the 'SITS' muscle or rotator cuff muscles.¹⁻² The glenoid cavity is small and shallow, the vertical diameter of the glenoid cavity is longer but wider below than above. The most common problem of shoulder joint replacements is the

osteoarthritis, post-traumatic arthritis, rotator cuff tear arthropathy, rheumatoid arthritis, avascular necrosis (osteonecrosis) and comminuted fractures of the shoulder joint.^{3,4} Any abnormality that disturbs the relationship of the subacromial structures may lead to impingement syndrome and the treatment used for the of impingement syndrome are acromioplasty or acromionectomy.⁵⁻⁸ The aim of the current study was to acquire morphometric data for the acromion process variations in shape and various dimensions of the acromion process of the scapula which will be important for the orthopaedic surgeons.

Aim and objective: To study the morphometric analysis of the acromion process of scapulae

Material and Method

The present Study was carried out in the department of anatomy at Jawaharlal Nehru Medical College in Collaboration with department of anatomy and

Datta Meghe Medical College, Nagpur Maharashtra. Total 152 subjects' scapula according to their side which was equally divided into 76 right and 76 left. The morphometric analysis of the acromion process of scapulae was recorded according as per Bigliani-Morrison et al.⁹ classification and dimensions were measured by using vernier callipers. Statistical analysis was done by using SPSS 21.0 software.

Observation and Results

A total of 152 dry scapulas were included in the study. Two groups were made and were equally divided into 76 right and 76 left scapulas each. It is observed that the mean length of acromion on either side does not differ significantly, while the mean width of acromion and its mean thickness if found to differ statistically significantly on both sides. The acromio-coracoid distance shows no significant difference on either side. [Table 1].

Table 1: Various parameters of right and left scapulae

Parameters	Right Mean/SD (cm) N=76	Left Mean/SD (cm) N=76	P value
Length of acromion	4.51± 0.54	4.46±0.44	0.53
Width of acromion	2.46±0.09	2.41±0.07	0.0002
Thickness of acromion	0.73±0.01	0.71±0.01	<0.01
Acromio-coracoid distance	3.08 ± 0.41	3.01 ± 0.21	0.18

Table 2: Types of acromion process

Type	Left(%)	Right(%)	P value
Type I	38%	37%	0.89
Type II	41%	43%	0.80
Type III	21%	20%	0.87

Type I scapulae in our study were 38%, type II as 41% and 21% were type III showing no significant difference on either side. [Table 2].

Discussion

Number of studies has been done previously on morphometry of the acromion process of the scapulae and its known association between shoulder impingement and the rotator cuff tears.⁹ There are many studies i.e. by the Singroha R et al¹⁰ (north India), Gosavi et al¹¹ (Maharashtra), Singh et al¹² (Rajasthan), Chandni Gupta

et al¹³ (Karnataka), Mansur et al¹⁴ (Nepalese), Paraskevas et al⁸ (Greek) revealed that the mean of the scapular length, width, thickness and coraco-acromial distance in centimeter found almost the same in correspondingly with our study. El-Din et al¹⁵ study revealed that in Egyptian population the mean of the scapular length, width, thickness and coraco-acromial distance found to be larger than in our study.

Natsis *et al.*¹⁶ observed that subacromial impingement syndrome and rotator cuff tears were found mostly in type III acromion's more in cases having enthesophytes formation. Nicholson *et al.*¹⁷ found type I (flat) 32%, type II (curved) 42%, and type III (hooked) 26% of cases in their study and this is almost similar to our study. We found type III acromion process was approximately 20 to 21%. It was almost half in comparison with the study conducted by Neslihan Boyan *et al.*¹⁸, one more study Mythraeyee Prasad *et al.*⁷ observed that type III acromion process was approximately 3% that was less than what we found in our study and it may be because of racial/traits variations seen with social dimension.

Presence of systemic disorders like hypertension¹⁸⁻²⁴, diabetes²⁵⁻³⁰ also play a key role in bone development and osteological deformities. Few of the other related studies on bone and joint disorders are available³¹⁻⁴⁴.

Conclusion

To conclude acromion process dimension knowledge are useful for orthopaedic surgeon during surgery of shoulder joint with associated pathology of the rotator cuff.

Ethical Clearance: Taken from institutional ethics committee.

Source of Funding: Self.

Conflict of Interest: Nil.

References

1. Susmita Saha, Neelam Vasudevava, Morphometric Evaluation of Adult Acromion Process in North Indian Population, Journal of Clinical and Diagnostic Research. 2017 Jan, Vol-11(1): AC08-AC11
2. Ellis H, Johnson D. Pectoral girdle and upper limb. Gray's Anatomy. 39th ed. [1]2004;817-49.
3. Manisha S. Raaj, Christilda Felicia, Sundarapandian S., Ashma K. A. Morphologic and morphometric analysis of glenoid cavity of human scapula, Int J Res Med Sci. 2019 Jan;7(1):52-57
4. Mamatha T, Pai SR, Murlimanju BV, Kalthur SG, Pai MM, Kumar B., Morphometry of glenoid cavity. Online J Health Allied Sci. 2011;10(3):1-4.
5. Neer CS., Impingement lesions, Clinical Orthopedic Related Researches. [2]1983;173:70-77.
6. Meyer AW., The minuter anatomy of attrition lesions, J Bone Joint Surg. [3]1931;13:341-60.
7. Mythraeyee Prasad, Sipra Rout, Priyanka and Clementina Stephen, Acromion Morphology and Morphometry in the Light of Impingement Syndrome and Rotator Cuff Pathology, Journal of the Anatomical Society of India | Volume 68, Issue 1, January-March 2019
8. Paraskevas G, Tzaveas A, Papaziogas B, Kitsoulis P, Natsis K, Spanidou S., Morphological parameters of the acromion. Folia Morphol (Warsz) 2008;67:255-60.
9. Bigliani L U, Morrison D S, April E W. The morphology of the acromion and its relationship to rotator cuff tears. Orthop Trans 1986; 10: 228
10. Ritu Singroha, Usha Verma, Preeti Malik, Suresh Kanta Rathee, Morphometric study of acromion process in scapula of north Indian population, Int J Res Med Sci. 2017 Nov;5(11):4965-4969
11. Gosavi S, Jadhav S, Garud R., Morphometry of Acromion process: A study of Indian scapulae. Int J Pharma Res Health Sci. 2015;3(5):831-35.
12. Singh J, Puhuja K, Agarwal R., Morphometric parameters of the acromion process in adult human scapulae. IJBAMR. 2013;2(8):1165-70.
13. Chandni Gupta, Abhilasha Priya, Sneha Guruprasad Kalthur, Antony Sylvan D'Souza, A morphometric study of acromion process of scapula and its clinical significance. CHRISMED Journal of Health and Research /Vol 1/Issue 3/ Jul-Sep 2014
14. Mansur DI, Khanal K, Haque MK, Sharma K., Morphometry of Acromion Process of Human Scapulae and its Clinical Importance amongst Nepalese Population. Kathmandu Univ Med J. 2012;38(2):33-6.
15. El-Din WAN and Ali MHM., The patterns of the Acromion process and Glenoid cavity in Egyptian scapulae. J Clin Diag Res. 2015;9(8):AC08-AC11.
16. K Natsis, P Tsikaras, T Totlis, I Gigis, P Skandalakis, H J Appell, J Koebeke, Correlation Between the Four Types of Acromion and the Existence of Enthesophytes: A Study on 423 Dried Scapulas and Review of the Literature, Clin Anat. 2007 Apr;20(3):267-72
17. Nicholson GP, Goodman DA, Flatow EL, Bigliani LU. The acromion: Morphologic condition and age-related changes. A study of 420 scapulas. J Shoulder Elbow Surg 1996;5:1-11.

18. Neslihan Boyan, Esin Ozsahin, Emine Kizilkanat, Roger W. Soames & Ozkan Oguz, Assessment of Scapular Morphometry, *Int. J. Morphol.* 2018. 36(4):1305-1309
19. Papalkar, P., S. Kumar, S. Agrawal, N. Raisinghani, G. Marfani, and A. Mishra. "Heterotaxy Syndrome Presenting as Severe Pulmonary Artery Hypertension in a Young Old Female: Case Report." *Journal of Gerontology and Geriatrics* 66, no. 2 (2018): 59–61.
20. Charan, N., M. Choudhari, M. Sonkusale, and R. Deshpande. "Anesthetic Management of Chronic Thromboembolic Pulmonary Hypertension for Pulmonary Endarterectomy." *Journal of Datta Meghe Institute of Medical Sciences University* 12, no. 4 (2017): 289–91. https://doi.org/10.4103/jdmimsu.jdmimsu_40_17.
21. Gaikwad, K.B., N.G. Joshi, and S.P. Selkar. "Study of Nitrosative Stress in 'Pregnancy Induced Hypertension.'" *Journal of Clinical and Diagnostic Research* 11, no. 3 (2017): BC06–8. <https://doi.org/10.7860/JCDR/2017/23960.9396>.
22. Yadav, S., M. Agrawal, C. Hariharan, D. Dewani, K. Vadera, and N. Krishna. "A Comparative Study of Serum Lipid Profile of Women with Preeclampsia and Normotensive Pregnancy." *Journal of Datta Meghe Institute of Medical Sciences University* 13, no. 2 (2018): 83–86. https://doi.org/10.4103/jdmimsu.jdmimsu_70_17
23. Kumar, S., P. Bhayani, D. Hathi, and J. Bhagwati. "Hyponatremia Initial Presenting Feature of Normal Pressure Hydrocephalus in Elderly Patient: A Rare Case Report." *Journal of Gerontology and Geriatrics* 66, no. 3 (2018): 156–57.
24. Bhinder, H.H.P.S., and T.K. Kamble. "The Study of Carotid Intima-Media Thickness in Prediabetes and Its Correlation with Cardiovascular Risk Factors." *Journal of Datta Meghe Institute of Medical Sciences University* 13, no. 2 (2018): 79–82. https://doi.org/10.4103/jdmimsu.jdmimsu_58_18.
25. Khatib, M.N., R. Kirubakaran, S. Gaidhane, A.H. Shankar, and Z. Quazi Syed. "Yoga for Improving Functional Capacity, Quality of Life and Cardiovascular Outcomes in People with Heart Failure." *Cochrane Database of Systematic Reviews* 2017, no. 7 (2017). <https://doi.org/10.1002/14651858.CD012015.pub2>.
26. Cladius, S., U. Jadhav, B. Ghewade, S. Ali, and T. Dhamgaye. "Study of Diabetes Mellitus in Association with Tuberculosis." *Journal of Datta Meghe Institute of Medical Sciences University* 12, no. 2 (2017): 143–47. https://doi.org/10.4103/jdmimsu.jdmimsu_62_17.
27. Bhinder, H.H.P.S., and T.K. Kamble. "The Study of Carotid Intima-Media Thickness in Prediabetes and Its Correlation with Cardiovascular Risk Factors." *Journal of Datta Meghe Institute of Medical Sciences University* 13, no. 2 (2018): 79–82. https://doi.org/10.4103/jdmimsu.jdmimsu_58_18.
28. Rathi, N., B. Taksande, and S. Kumar. "Nerve Conduction Studies of Peripheral Motor and Sensory Nerves in the Subjects with Prediabetes." *Journal of Endocrinology and Metabolism* 9, no. 5 (2019): 147–50. <https://doi.org/10.14740/jem602>.
29. Walinjkar, R.S., S. Khadse, S. Kumar, S. Bawankule, and S. Acharya. "Platelet Indices as a Predictor of Microvascular Complications in Type 2 Diabetes." *Indian Journal of Endocrinology and Metabolism* 23, no. 2 (2019): 206–10. <https://doi.org/10.4103/ijem.IJEM-13-19>.
30. Phadnis, P., M.A. Kamble, S. Daigavane, P. Tidke, and S. Gautam. "Prevalence and Risk Factors – Hemoglobin A1c, Serum Magnesium, Lipids, and Microalbuminuria for Diabetic Retinopathy: A Rural Hospital-Based Study." *Journal of Datta Meghe Institute of Medical Sciences University* 12, no. 2 (2017): 121–32. https://doi.org/10.4103/jdmimsu.jdmimsu_59_17.
31. Dande, R., A.R. Gadail, S. Sarode, M.P.M. Gadail, S.M. Gondivkar, M. Gawande, S.C. Sarode, G.S. Sarode, and S. Patil. "Oral Manifestations in Diabetic and Nondiabetic Chronic Renal Failure Patients Receiving Hemodialysis." *Journal of Contemporary Dental Practice* 19, no. 4 (2018): 398–403. <https://doi.org/10.5005/jp-journals-10024-2273>.
32. Mundada, G., S. Khan, S. Singhanian, V. Gupta, P. Singh, and S. Khan. "Type-I Monteggia with Ipsilateral Fracture of Distal Radius Epiphyseal Injury: A Rare Case Report." *Annals of African Medicine* 16, no. 1 (2017): 30–32. https://doi.org/10.4103/aam.aam_55_16.
33. Belekar, V. "A Comparative Study to Evaluate the Efficacy of Butorphanol as an Adjuvant to Epidural Analgesia for Rib Fractures." *Journal of Datta Meghe Institute of Medical Sciences University* 12, no. 3 (2017): 166–69. <https://doi.org/10.4103/>

jdmimsu.jdmimsu_105_17.

34. Kapse, S., S. Surana, and A.K. Shastri. "Transpalatal Wiring for the Management of Sagittal Fracture of the Maxilla/Palate." *International Journal of Oral and Maxillofacial Surgery* 46, no. 8 (2017): 1059–60. <https://doi.org/10.1016/j.ijom.2017.02.1271>.
35. Karia, H., S. Shrivastav, and A.K. Karia. "Three-Dimensional Evaluation of the Airway Spaces in Patients with and without Cleft Lip and Palate: A Digital Volume Tomographic Study." *American Journal of Orthodontics and Dentofacial Orthopedics* 152, no. 3 (2017): 371–81. <https://doi.org/10.1016/j.ajodo.2016.12.026>.
36. Wankhade, P.A., S.K. Patond, and B.H. Tirpude. "Roentgenographic Evaluation of Bones at Wrist Joint for Osteological Maturity for Academic and Judicial Interest." *Indian Journal of Forensic Medicine and Toxicology* 13, no. 4 (2019): 131–36. <https://doi.org/10.5958/0973-9130.2019.00275.5>.
37. Mittal, V., T. Jagzape, and P. Sachdeva. "Care Seeking Behaviour of Families for Their Sick Infants and Factors Impeding to Their Early Care Seeking in Rural Part of Central India." *Journal of Clinical and Diagnostic Research* 12, no. 4 (2018): SC08-SC12. <https://doi.org/10.7860/JCDR/2018/28130.11401>.
38. Kumar, S., S. Jain, A. Wanjari, and S. Mandal. "Development and Validation of a Modified Frailty Risk Index as a Predictor of Mortality in Rural Elderly People." *Asian Journal of Gerontology and Geriatrics* 14, no. 1 (2019): 15–22. <https://doi.org/10.12809/ajgg-2018-315-0a>.
39. Bagde AD, Kuthe AM, Quazi S, Gupta V, Jaiswal S, Jyothilal S, et al. State of the Art Technology for Bone Tissue Engineering and Drug Delivery. *IRBM* 2019;40(3):133-144.
40. Khanam N, Wagh V, Gaidhane AM, Quazi SZ. Assessment of work-related musculoskeletal morbidity, perceived causes and preventive activities practiced to reduce morbidity among brick field workers. *Ind J Community Health* 2019;31(2):213-219.
41. Deshpande, S., S. Phatak, G. Marfani, N. Gupta, S. Daga, and S. Samad. "Sonographic Evaluation of Painful Shoulder and Its Comparison with Clinical Diagnosis." *Journal of Datta Meghe Institute of Medical Sciences University* 13, no. 1 (2018): 12–15. https://doi.org/10.4103/jdmimsu.jdmimsu_52_18.
42. Rawlani, S.M., R. Bhowate, S. Kashikar, M. Khubchandani, S. Rawlani, and R. Chandak. "Morphological Evaluation of Temporomandibular Joint in Indian Population." *Brazilian Dental Science* 21, no. 1 (2018): 44–53. <https://doi.org/10.14295/bds.2018.v21i1.1488>.
43. Kumar, G., S.V. Phatak, B. Lakhkar, and S.K. Yadav. "Diagnostic Role of Magnetic Resonance Imaging in Rotator Cuff Pathologies." *Journal of Datta Meghe Institute of Medical Sciences University* 12, no. 1 (2017): 7–10. https://doi.org/10.4103/jdmimsu.jdmimsu_11_17.
44. Mazumder A, Nagrale N. Estimation of Age from Shoulder Joint by Radiographic Assessment of Epiphyseal Fusion of Related Bones in Population of Chhattisgarh: A Cross Sectional Study. *Medico-legal Update*. 2019; 19 (2): 7-11.