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SHORT COMMUNICATION
КРАТКОЕ СООБЩЕНИЕ

Suprascapular notch morphometric study


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Abstract. Relevance. The suprascapular notch is one of the most crucial areas of the scapula from a clinical standpoint. Aside from its anatomical relevance, the suprascapular notch type may also have some clinical implications for suprascapular nerve entrapment. *Aim of the study* was the determination of the different dimensions of the suprascapular notch based on the maximum depth (MD) and superior transverse diameter (STD), as well as the clinical relation between those dimensions and suprascapular nerve entrapment. *Materials and Methods.* The study's materials were 100 unknown dry human scapulae from the anatomy department of the Mahatma Gandhi Medical College, Sitapura, Jaipur, Rajasthan. Each scapula was studied for suprascapular notch. From each of the scapulae, maximum depth and superior transverse diameter were determined. Fifty were from right side and Fifty were from left side. Different types of suprascapular notches were observed based on maximum depth and superior transverse diameter. *Results and Discussion.* In this study, the overall percentage distribution frequency of the suprascapular notch in 100 scapulae is MD > STD (25 %), MD = STD (0 %), STD > MD (60 %) and SSN Absent (15 %) respectively. The most common SSN type is STD > MD (60 %) type and least common SSN type is MD = STD (0 %) type. *Conclusion.* Morphological examination of the scapular notch reveals a common site of nerve compression and also demonstrates the surgical importance of the scapular nerve during shoulder surgery.

Key words: suprascapular notch, morphometry, entrapment, maximal depth, superior transverse diameter

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Conflict of interest statement. The authors declare no conflict of interest.

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Introduction

The suprascapular notch is one of the most crucial areas on the scapula from a clinical standpoint (SSN). This is a depression in the outer part of the upper edge of the scapula, inside the coracoid process. The SSN is closed through the advanced transverse scapular ligament. Below this ligament are the supra scapular nerve and vein, and the suprascapular artery runs above the superior transverse scapular ligament. The suprascapular nerve provides sensory branches to the rotator cuff muscles, motor branches to the supraspinatus and infraspinatus muscles, and motor branches to the ligamentous structures of the shoulder and acromio- clavicular joints. Accordingly, during arthroscopic shoulder procedures, this notch serves as a crucial landmark for the suprascapular nerve [1–4].

Clinically viable predisposing factors for compression neuropathy and suprascapular nerve entrapment include morphological variations of the SSN [5]. According to Kopell and Thompson, suprascapular nerve entrapment results in arm weakness, difficulties performing external rotation and abduction, and atrophy of the supra and infra spinatus muscles [6]. The Rengachary et. Al. divided this notch into six varieties based on its shape, and they also claimed that the size of the suprascapular notch contributed to the likelihood of entrapment of the suprascapular nerve. They believed that a little notch offered a higher risk of a nerve impingement than a large one. The suprascapular notch is one of the scapula's key clinical landmarks [7, 8]. Aside from its anatomical significance, the

suprascapular notch type may also have some clinical significance for suprascapular nerve entrapment. The purpose of the current research was to determine the different dimensions of the suprascapular notch based on the maximum depth (MD) and superior transverse diameter (STD), as well as the clinical relation between those dimensions and suprascapular nerve entrapment.

Materials and methods

Materials for the present research included 100 unidentified dried scapulae from the anatomy department of the Mahatma Gandhi Medical College, Sitapura, Jaipur, Rajasthan. 50 of the 100 scapulae belonged to the right side and 50 to the left. With the aid of a vernier calliper, the suprascapular notch's (SSN) maximum depth (MD) and superior transverse diameter (STD) were examined and measured. Following that, the suprascapular notch's maximum depth and superior transverse diameter were determined. On the basis of maximum depth (MD) and superior transverse diameter (STD), the percentage distribution of the suprascapular notch was categorised into four categories.

MD > STD

MD = STD

STD > MD

Absent

The table that is provided below under results contains a summary of all the results of the aforementioned findings.

Results and discussion

An analytical morphometric analysis of 100 dry, unidentified suprascapula (50 right and 50 left) (Table 1).

Sinkeet et. al. described 6 types of SSN but in our study 4 types of SSN observed, i.e. (that) MD>STD, MD=STD, STD>MD, SSN absent patterns occurred in 25 %, 0 %, 60 %, & 15 % respectively [10].

STD>MD frequency pattern observed highest (60 %) which is in conformity with highest available frequency in others respectively. In the present study, the STD of the notch was more than the MD (60 %) [12, 13].

The least frequency pattern MD=STD was 0 % in our study but Sinkeet et. al. and Rengachary et. al. (Table 2) observed 4 % in contrast to Natsis et. al. (6 %) and Murlidhar (8.65 %) [7, 9, 11].

The total percentage distribution frequency of suprascapular notch in 100 scapulae as MD>STD (25 %), MD=STD (0 %), STD>MD (60) and SSN Absent (15 %) respectively.

However in comparison with other studies, in the present study, SSN type III was the most prevalent while type II was the least prevalent.

SSN-I type observed by Sinkeet, Rangachary, Natsis and Murlidhar was 22 %, 8 %, 6 % and 21.15 %

respectively in comparison to these 15 % is in present study. This probably reflects the racial population differences.

The coexistence of notch type-I (25 %) with the foramen can theoretically lead to a decrease in the size of the foramen formed, thereby increasing the probability of nerve entrapment in the foramen, calls extra caution for surgeons operating on the shoulder joint.

Table 1
Suprascapular notch (SSN) measured on the basis of maximal depth (MD) and superior transverse diameter (STD)

Types of SSN	Right side		Left side		Total	
	No.	(%)	No.	(%)	No.	(%)
MD> STD	8	8	17	17	25	25
MD = STD	0	0	0	0	0	0
STD> MD	26	26	34	34	60	60
Absent	6	6	9	9	15	15

Abbreviations: SSN – suprascapular notch's; MD – maximum depth; STD – superior transverse diameter.

Table 2
Incidences of various authors on different suprascapular notch kinds

Author, reference	Year	Population	Sample size	Type (I) MD>STD	Type (II) MD=STD	Type (III) STD>MD	Type (IV) SSN Absent	Type (V)	Type (VI)
Rengachary et al. [7]	1979	American	211	31 %	4 %	48 %	8 %	3 %	6 %
Natsis et al. [9]	2007	Greek	423	24 %	6 %	40 %	6 %	13 %	11 %
Sinkeet et al. [10]	2010	Kenyan	138	21 %	4 %	29 %	22 %	5 %	18 %
Muralidhar [11]	2013	India	104	21.15 %	8.65 %	59.61 %	2.88 %	5.76 %	1.93 %
Urguden [12]	2011	Turkish	100	40 %	-	24 %	-	-	-
Wang [13]	2011	China	295	28 %	58.16 %	28.23 %	3 %	-	-
Present study	2019	Indian	100	25 %	0	60 %	15 %	-	-

Abbreviations: SSN – suprascapular notch's; MD – maximum depth; STD – superior transverse diameter.

In the study done by Apurba Patra et al., in 67.34 % scapulae transverse diameter of the notches is more than vertical diameter and in 14.28 % vertical diameter was more than transverse diameter [14, 15]. Which was also same in present study (Transverse diameter > Vertical diameter). When diagnosing and treating cases of shoulder pain brought on by suprascapular nerve entrapment, as well as when performing suprascapular nerve blocks during shoulder procedures, the many types of suprascapular notch and measures are highly important. In order to prevent iatrogenic suprascapular nerve damage during shoulder surgical operations, safe zone distances are crucial [16]. Open surgical methods that necessitate dissection of the posterior shoulder joint, depend on the distance between the suprascapular notch and the edge of the glenoid cavity [17, 18]. Based on the crucial distance within which these procedures can be performed safely, a safe zone has been developed in order to prevent damage to the suprascapular nerve during these procedures [19, 20]. To prevent nerve damage, greater caution must be used when doing shoulder surgeries.

Conclusion

Our morphological study of suprascapular notch reveals the typical location for nerve compression. Choosing the right type of notch can assist prevent iatrogenic nerve lesions in patients with torn rotator cuffs. The suprascapular nerve's surgical value is further demonstrated by the morphological analysis of the suprascapular notch after shoulder surgery.

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Морфометрическое исследование лопаточной вырезки

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Аннотация. *Актуальность.* Лопаточная вырезка является одной из наиболее важных областей лопатки с клинической точки зрения. Помимо анатомического значения, тип надлопаточной вырезки может также иметь некоторые клинические последствия при ущемлении надлопаточного нерва. Целью исследования было определение различных размеров надлопаточной вырезки на основе максимальной глубины (MD) и верхнего поперечного диаметра (STD), а также клинической связи между этими размерами и ущемлением надлопаточного нерва. *Материалы и методы.* Материалами для исследования послужили 100 сухих лопаток человека из отделения анатомии Медицинского колледжа Махатмы Ганди, Ситапура, Джайпур, Раджастан. Каждую лопатку исследовали на наличие лопаточной вырезки. Для каждой лопатки определяли максимальную глубину и верхний поперечный диаметр. Пятьдесят были правосторонних и пятьдесят были левосторонних. Наблюдались различные типы надлопаточных вырезов, основанные на максимальной глубине и верхнем поперечном диаметре. *Результаты и обсуждение.* В этом исследовании общая процентная частота распределения надлопаточной вырезки в 100 лопатках составляет MD>STD (25 %), MD=STD (0 %), STD>MD (60 %) и отсутствие лопаточной вырезки (15 %) соответственно. Наиболее распространенным типом лопаточной вырезки является тип STD>MD (60 %), а наименее распространенным типом MD=STD (0 %). *Вывод.* Морфологическое исследование вырезки лопатки выявляет обычное место сдавления нерва, а также демонстрирует хирургическую важность лопаточного нерва при операциях на плече.

Ключевые слова: лопаточная вырезка, морфометрия, ущемление, максимальная глубина, верхний поперечный диаметр

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