

Case Report

UNILATERAL AND COMPLETE AGENESIS OF RIGHT PECTORALIS MAJOR MUSCLE

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ABSTRACT

Introduction: Pectoralis major Myocutaneous flaps (PMMC) are extensively used for Head, Neck, Face and post mastectomy mammary gland reconstructive surgeries. Pectoralis major is responsible for flexion, adduction and medial rotation of shoulder joint. Its absence may be obvious because of compromised movement of shoulder joint or as a part of Poland's syndrome or may be sporadic as seen in our case.

Case study: Pectoralis major muscle was completely absent on right side of an adult female cadaver.

Result: Complete unilateral agenesis of right Pectoralis major muscle was found in an adult female cadaver during routine undergraduate dissection in the department of Anatomy. Right Mammary gland was lying directly on hypertrophied Pectoralis minor muscle. **Discussion:** Awareness about absence of Pectoralis major muscle is a must for planning and success of various reconstructive surgeries, flawless interpretation of Radiographs, CT and MRI scans. Unilateral and complete agenesis of Pectoralis major muscle not associated with any other anomaly visible to naked eye as seen in our case is a rare finding and hence needs to be documented.

KEY WORDS: PMMC flaps, Poland's Syndrome, Variations of Pectoral muscles, Hyper radiotranslucent lung.

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Access this Article online

Quick Response code



DOI: 10.16965/ijar.2015.262

Web site: International Journal of Anatomy and Research
ISSN 2321-4287
www.ijmhr.org/ijar.htm

Received: 09 Sep 2015	Accepted: 02 Sep 2015
Peer Review: 09 Sep 2015	Published (O): 30 Nov 2015
Revised: None	Published (P): 31 Dec 2015

INTRODUCTION

Pectoralis major is a triangular muscle present on anterior aspect of thoracic wall. Clavicular and Sternocostal heads of the Pectoralis Major muscle originate from anterior aspect of clavicle, sternum and anterior aspect of one to six ribs respectively. Fibres twist on themselves to get inserted on lateral lip of intertubercular sulcus of humerus. It is supplied by medial and lateral pectoral nerve and brings about Adduction,

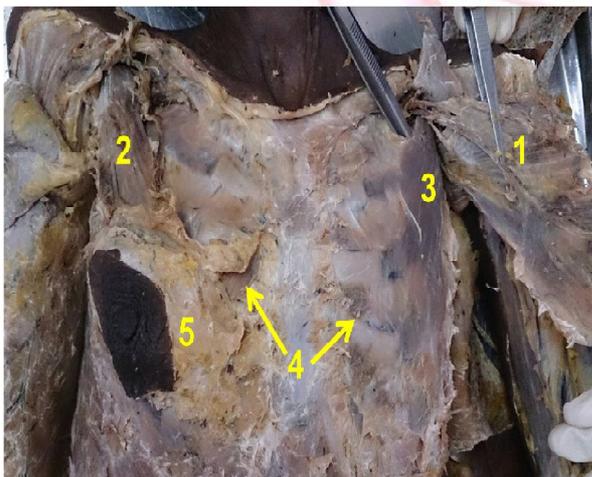
Flexion and Medial rotation of shoulder joint [1]. This muscle is used for post mastectomy breast reconstruction surgery [2] and as myocutaneous flaps for surgeries related to shoulder and head, neck, face region [3]. Variations of Pectoralis major muscle are commonly seen in Poland syndrome which is a congenital anomaly that consists of the unilateral or bilateral absence or hypoplasia of the Pectoralis major muscle associated with other malformations of the

anterior chest wall, upper limb and breast. The incidence of Poland's syndrome may be 1: 20000 to 1: 50000 live births [4]. Variations in Pectoralis major muscle not associated with Poland's syndrome but associated with some other congenital anomaly has also been mentioned in literature. It may be familial or sporadic [5,6]. Complete agenesis of the muscle may have clinical implication affecting various movements and actions of the shoulder joint [3] and may pose difficulty during various surgical procedures and interpretation of X-ray [4], CT and MRI scans [6].

CASE REPORT

Variation in the right pectoral region of an adult female cadaver preserved in 10% formalin was noted during routine undergraduate dissection for medical students in the department of Anatomy. On reflecting the skin and superficial fascia of right pectoral region the important content of superficial fascia, the mammary gland was seen lying directly on the Pectoralis minor muscle (Figure 1). The Pectoralis major muscle was completely absent on right side. Neither clavicular nor sternocostal fibres of Pectoralis major muscle were seen. Right sided

Fig. 1: Showing right pectoral region with Pectoralis minor muscle.



1= left Pectoralis major muscle, 2= right Pectoralis minor muscle, 3= Mammary gland, 4, 5= Intercostals muscles on right side, 6= Clavicular and Sternocostal fibres of left Pectoralis major muscle.

Intercostal muscles were directly seen on reflecting the skin of right pectoral region. Right Pectoralis minor muscle appeared to be hypertrophied (Figure 2) when compared with left side. Medial pectoral nerve supplied the Pectoralis

minor muscle on the right side. Right lateral and medial pectoral nerve pursued their normal course. Naked eye examination did not show any other associated soft tissue or bony anomaly of right upper extremity like shortness of fingers or syndactyly. The naked eye examination of ribs, clavicle, sternum and axillary region were normal on right side. The Pectoralis major and Pectoralis minor muscle, breast, nipple, and rest of the axillary region were normal on the left side.

Fig. 2: Showing hypertrophied Right Pectoralis minor muscle.



1= left Pectoralis major muscle (reflected), 2= right Pectoralis minor muscle hypertrophied (compared to left side), 3= left Pectoralis minor muscle, 4= Intercostal muscles, 5= Mammary gland.

DISCUSSION

Pectoral muscles show variety of variations as described in the literature. Katherine Marie Huber et al aptly describes them and has discussed their utility and implications in breast reconstruction surgery [2]. When these variations are associated with Poland's syndrome it may present clinically with classical features constituting complete absence or partial agenesis of Pectoralis major and Pectoralis minor muscle, ipsilateral breast and nipple hypoplasia/ aplasia, deficiency of subcutaneous fat and axillary hair along with congenital abnormality of ipsilateral chest wall and superior extremity like syndactyly and brachydactyly. The essential criteria to diagnose a patient with Poland's syndrome is partial or complete agenesis of Pectoralis major muscle along with one associated abnormality mentioned above [4].

Depending on severity of anomaly, the patient may present with signs and symptoms ranging from asymmetry in the gross appearance of chest wall, hypoplastic subcutaneous tissue, position of nipple, distribution of axillary hair, limitation of movements, weakness of shoulder extension, defects of upper extremity to dyspnoea on exertion.

Hayrettin Gocmen, Yucel Akkas, Selim Doganay describes two cases where in patients presented with (Case 1) congenital left chest deformity, burning sensation and lack of strength in left arm during shoulder extension and (Case 2) deformity of right chest wall along with lack of strength in right arm and shoulder associated with dyspnoea on exertion [6].

Absence of Pectoral muscles could be detected accidentally during general examination of patient or as an associated finding of various radiologic procedures as mentioned by Homayoon Rahbari [7]. Homayoon Rahbari quotes that unilateral hyper-radiolucence of the lung on roentgenogram merits extensive investigation. One of the simplest reasons for the anomaly is the congenital absence of pectoral muscles.

This variation may be an isolated cadaveric finding as in our case or may be associated with Poland's syndrome along with concomitant findings not related to Poland's syndrome as reported by D T Pisteljic et al where Poland's syndrome was found concomitantly with coloboma of optic disc [8].

Pectoral muscles develop from myoblasts that migrate in upper limb buds from lower five cervical and first thoracic segment. Exact etiology of this malformation is not yet known and it could be genetic or environmental or sporadic with an unexplained cause. However any variation in the development or agenesis of limbs or its components can be due to 1. Arrest at any stage of development. 2. Failure of differentiation. 3. Duplication 4. Hypoplasia. 5. Focal defects. 6. Abnormal apoptosis of components [9].

Myoblasts from which Pectoralis major muscle would develop might have, primarily failed to develop or migrate to their destined position [9] or myoblasts might have developed and migrated to their destined position but have

undergone apoptosis secondarily due to lack of nerve and or blood supply [10] could be the possible explanation of agenesis of Pectoralis major muscle as seen in our case. Hypertrophy of Pectoralis minor muscle could be due to its overuse so as to compensate for the absence of Pectoralis major muscle.

The exact aetiology of Poland's syndrome still remains obscure. It is not exactly known whether complete unilateral agenesis of right Pectoralis major as seen in our case represents one end of the spectrum of Poland's syndrome or could be because of reduced penetrance or is sporadic. Subject probably lived a normal life in our case. Being a cadaveric finding it is difficult to comment about the family history, functional compromise due to absence of the muscle and limitation of shoulder movements.

Young Hee Lee has reported a case of 22 year old soldier where no diagnostic and therapeutic procedures were performed at the time of recruitment because there was no difficulty in performing routine activities. During military training he however faced difficulty in throwing grenade and rope climbing and was sent for medical assessment. On general examination, only abnormality detected was asymmetric configuration of chest wall and absence of axillary fold on right side. Further evaluation of the subject confirmed the absence of Pectoralis major and rudimentary Pectoralis minor muscle on right side [11]. Similar difficulty can arise when obvious abnormality is not detected on case history and general examination of patient.

Variety of presenting symptoms described in literature makes it necessary for a clinician to be aware of Poland anomaly while assessing the patient with reduced power of shoulder girdle, interpretation of radiographs with hyper translucent lung, loss of volume within the hemithorax and reporting of CT and MRI scans with absent pectoral or other shoulder girdle muscles.

Pectoralis major Myocutaneous flaps (PMMC) is used for various reconstructive surgeries of mammary gland, shoulder joint and head, neck, face region. Clinical testing of Pectoral muscles to access their presence and normal function and confirmation of their presence in case of

abnormal clinical test should be done before planning PMMC flap surgeries.

CONCLUSION

We reported a case of unilateral and complete agenesis of right Pectoralis major muscle along with hypertrophied Pectoralis minor muscle in an adult female cadaver. The probable cause for this anomaly could be improper migration of myoblasts during embryogenesis and /or associated compromised blood supply to the region leading to agenesis of Pectoralis major muscle. Whether this isolated finding represents one end of the spectrum of Poland's syndrome or is sporadic remains obscure. Irrespective of the aetiology of the anomaly, it becomes mandatory for the clinician to be aware of this anomaly for treating the patient with optimum care and correct interpretation of various radiologic procedures.

Conflicts of Interests: None

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How to cite this article:

Vaishali Paranjape, Amrita Bharti, Vasanti Arole. UNILATERAL AND COMPLETE AGENESIS OF RIGHT PECTORALIS MAJOR MUSCLE. *Int J Anat Res* 2015;3(4):1529-1532. DOI: 10.16965/ijar.2015.262