

# Unilateral absence of ascending and transverse trapezius fibers accompanied by mild thoracic scoliosis: a case report

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## SUMMARY

During routine anatomical dissection at the David Geffen School of Medicine at UCLA, a variation of partial unilateral trapezius muscle absence was found in a 95-year-old Caucasian female. A broad sheet of aponeurosis originating from all thoracic vertebrae completely replaced the ascending fibers of the left inferior trapezius muscle. Transverse fibers of the left trapezius muscle appeared hypotrophied and were sparsely distributed within the aponeurosis. Descending fibers of the left trapezius muscle were comparable to the right side. The main clinical finding was a grossly visible 5-degree thoracic scoliosis toward the intact trapezius muscle. No other significant abnormalities in musculature or anatomy could be found. While others have reported on unilateral, bilateral, complete, and partial absence of trapezius muscle, to our knowledge this case is unique from those previously reported in the literature.

**Key words:** Partial absence of trapezius muscle – Hypoplastic trapezius muscle - Underdeveloped trapezius muscle – Mild thoracic scoliosis

## INTRODUCTION

Anatomical variations of the trapezius muscle are rare, but do occur in humans. These variations can be unilateral or bilateral, with partial or complete absence of the muscle. The first case of bilateral complete absence of the trapezius muscle was described by Sheehan (1932). A 70-year-old male cadaver had an intact, normal left spinal accessory nerve (CN XI); on the right, the nerve projected only a few innervating fibers extra-cranially to a feebly developed ipsilateral sternocleidomastoid muscle. A few years later, Selden (1935) reported a novel case of a living 20-year-old male patient with congenitally absent trapezius muscles bilaterally, with concurrent loss of both rhomboid major muscles. Horan and Bonafede (1977) observed another 20-year-old male patient with bilaterally absent trapezius muscles, this time with concurrent loss of the sternal head of both pectoralis major muscles and mild hypertrophy of the deltoid muscles. Gross-Kieselstein and Shalev (1987) detailed a similar presentation in a 17-year-old male patient with bilaterally absent trapezius muscles, concurrent with moderate weakness of the pectoralis, supraspinatus, and serratus anterior muscles. The patient's older brother possessed an identical, but unilateral, deficit, providing novel evidence for a hereditary pattern to this type of muscular deficit. Newman (2011) reported another familial connection. A 5-year-old boy presented with bilateral aplasia of the trapezius muscle. All other shoulder girdle muscles were unremarkable; how-

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ever, the shoulders themselves were down-slanting and anteriorly displaced, leading to a webbed neck appearance. The boy's father had aplastic ascending muscle fibers; both father and son had campodactyly present bilaterally.

Debeer (2002) described a 34-year-old female patient with Poland Syndrome, a disorder characterized by unilateral pectoralis muscle deficiency with or without other ipsilateral abnormalities. Specifically, this patient had pectoralis muscle deficiency and a unilateral aplastic trapezius muscle. The cause of Poland Syndrome is unknown, but it has been proposed that the deficiency may result from disruption of early embryologic subclavian and vertebral artery blood supplies. Yiyit (2015) performed a clinical analysis of 113 patients diagnosed with Poland syndrome; seven percent of patients had trapezius muscle involvement.

Complete unilateral absence of the trapezius muscle is described in three case reports (Adams, 2003; Allouh, 2004; Nooij and Oostra, 2006). Adams (2003) presented an infant born with unilateral aplasia of the trapezius muscle and ipsilateral sternocleidomastoid muscle, resulting in severe torticollis. This case was considered hereditary as the father and paternal grandfather of the infant had a forme fruste of muscular aplasia as well. Allouh (2004) described an 87-year-old male cadaver with complete unilateral absence of the left trapezius muscle accompanied by loss of the ipsilateral trapezius portion of CN XI, its related arterial vasculature, along with an ipsilateral accessory palmaris longus muscle. During dissection of a 67-year-old female cadaver, Nooij and Oostra (2006) reported a complete absence of the left trapezius muscle, but detailed that a few scattered muscle fiber bundles remained in the ascending part of the trapezius muscle.

Partial absences of the trapezius muscle are described relative to the three portions of the muscle. The superior portion, also referred to as occipital or cervical, consists of descending fibers that originate superiorly from the external occipital protuberance and nuchal line of the occipital bone, medially from the nuchal ligament, and insert on the lateral aspect of the clavicle. The middle portion has transverse fibers that originate from C7 and T1, and travel laterally to insert on the acromion and spine of the scapula. The inferior portion is formed by ascending fibers that originate medially from the thoracic vertebrae and converge superolaterally on the deltoid tubercle of the scapula (Johnson 1994). Both Rahman and Yamadori (1994) and Kwak (2003) described cases of female cadavers (68 and 52 years old, respectively) with isolated accessory cleido-occipitalis muscles that developed separately from descending fibers of the trapezius muscle. Tigga (2014) also reported on an abnormal occipital trapezius muscle, this time in a 55-year-old male cadaver. Superior descending fibers originating from the nuchal line between C1 to

C4 were replaced bilaterally by a thin fibrous lamina; all descending fibers inferior to C4 were found in that fascia. CN XI and all musculature of the shoulder girdle were unremarkable; however, a variation was observed in the anterior abdominal wall where the transversus abdominis muscle was the sole component of the posterior wall of the rectus sheath superior to the arcuate line. A case report by Witbreuk (2007) detailed a 10-year-old male patient with partial unilateral absence of the descending trapezius muscle. The boy presented with a winged scapula on his non-dominant right side along with shoulder asymmetry. Physical examination revealed a palpable fibrous cord where the descending fibers of the trapezius muscle were expected to lie. The patient had a history of torticollis on the ipsilateral side that resolved with physiotherapy.

Four case studies described partial absence of ascending fibers of the trapezius muscle (Emsley and Davis, 2001; Garbelotti, 2001; Bergin, 2011a, b). Emsley and Davis (2001) observed hypoplastic fibers that were one-third to two-thirds as thick as the typical right muscle fibers. Morphometric analysis comparing muscle surface area revealed that the left trapezius was 50% smaller than the right. Nerve supply was normal, suggesting a developmental etiology. Garbelotti (2001) detailed an individual case report of a male cadaver with an aponeurotic sheet extending to the level of T6 in the place of left ascending trapezius fibers; only a few muscle fibers were found in this aponeurosis upon histological analysis. Some transverse fibers closest to the descending portion were also replaced by the aponeurosis while the rest of the fibers appeared typical. Bergin published two reports on trapezius anomalies, for a total of four patients, in 2011. In a study of two sisters (56 and 44 years old) and the son (21 years old) of one of the sisters, all three family members had malformation of ascending trapezius muscle fibers to varying degrees. The two sisters had bilateral absence of ascending trapezius fibers whereas the son was affected only on the left side, inferior to the T6 vertebral level. In the second report (Bergin, 2011b), the fourth patient, a 22-year-old male, presented with unilateral partial absence of left trapezius muscle from T6 to T12. No other muscle abnormalities were reported for any of these four patients.

In this report, we describe a variation of trapezius muscle absence that, to our knowledge, is unique from those previously reported in the literature. This paper describes a case of partial unilateral absence of the trapezius muscle found during routine dissection of a human cadaver.

## CASE REPORT

A variation of trapezius muscle absence was found during routine anatomical dissection of a 95-

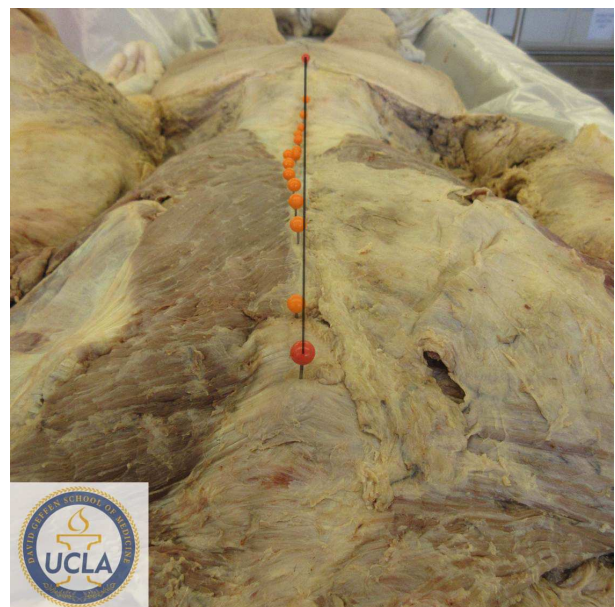
**Fig. 1.** Unilateral partial aplasia of the left trapezius muscle. Ascending fibers of the left trapezius muscle were completely replaced by a broad sheet of aponeurosis that originated at all thoracic vertebrae and had an almost identical shape to the unaffected right side.



**Fig. 2.** Unilaterally hypotrophied transverse trapezius muscle fibers. Lines approximate the boundaries of transverse fibers to highlight the sparse nature of these fibers on the left trapezius muscle.



year-old Caucasian female in the instructional gross anatomy laboratory of the David Geffen School of Medicine at UCLA. Ascending fibers of the inferior thoracic portion of the left trapezius muscle were completely replaced by a broad sheet of aponeurosis (Fig. 1). Transverse fibers on the left appeared hypotrophied and were partially replaced by an aponeurosis as compared to the right side (Fig. 2). Descending fibers of the left trapezius muscle appeared identical to the right side; they were innervated by the dorsal ramus of the cervical root supplying the splenius capitis muscle. A vascular bundle was dissected within the aponeurosis, but appeared degenerative and non-functioning. No nerve fibers were grossly located in the transverse or ascending portions of this aponeurosis. No other abnormalities in musculature or anatomy could be found; the shoulder girdle anatomy looked typical. When the aponeurosis was reflected superiorly, normal rhomboid muscles were observed. A couple of small, sparse muscle fibers were grossly visible inside the aponeurotic sheet and appeared to be non-functional. These fibers measured 2.5 cm in length, 3 mm in width, and less than 1 mm in depth. The main clinical finding was clearly visible scoliosis, a 5-degree deviation, of the thoracic vertebral column (Fig. 3). There was no sign of injury or surgical intervention to the region.



**Fig. 3.** Grossly visible thoracic scoliosis viewed from the head. Orange pins were placed in the interspinous spaces of thoracic and lumbar vertebrae. The superior red pin was placed in the first interspinous space where left trapezius fibers were completely absent from the aponeurosis. The inferior red pin was placed along the sacral crest just inferior to the PSIS. The black line represents 0° of thoracic scoliosis.

## DISCUSSION

The closest case report to ours is Garbelotti (2001). Ascending and transverse fibers were affected in both cadavers; however, several differences exist between the two cases. The inferior portion of the muscle described by Garbelotti (2001) was replaced by an aponeurosis that extended to T6 inferiorly; the aponeurosis we describe originated at all thoracic vertebrae and had an almost identical shape and surface area to the unaffected side. In Garbelotti's case report, transverse fibers closest to the ascending fibers were replaced by the aponeurosis while the more superior transverse fibers remained unaffected. In our case, the entire section of transverse fibers was hypotrophied and interspersed among fascia. Additionally, Garbelotti did not mention abnormal spine curvature in the cadaver. Scoliosis is considered clinically significant at 10 degrees (Weinstein, 2014). We measured a scoliotic deviation of 5 degrees.

As such, we assume there was no clinical significance; however, the deviation was grossly and clearly visible. Interestingly, the scoliosis appeared to be located in exact alignment with the absent, left-sided ascending fibers. We postulate that the right trapezius muscle may have pulled the spine out of alignment toward the right side as a result of an absent counterforce muscle on the left.

A review of the literature, particularly closely resembling cases of unilateral partial absence of trapezius muscles, aids us in determining the etiology of our case. In the 16 case reports cited above, 21 instances of aplastic trapezius were presented, including 9 in cadavers.

Only four case reports (Emsley and Davis, 2001; Garbelotti, 2001; Bergin, 2011a, b), with six unique patients and cadavers, reported unilateral partial absence of ascending and transverse fibers of the trapezius muscle with no other atypical musculature. Our case fits into this category. Still, our case remains unique, as the missing fiber and aponeurosis pattern found in the UCLA specimen has not been previously described. Poland syndrome can be eliminated from the diagnosis, specifically due to intact pectoralis muscle. Past medical history of the UCLA donor neither indicated torticollis nor a surgical procedure to remove the trapezius. Moreover, no indication of injury to nervous structure leads us to believe that the etiology was congenital in origin. The muscle did not appear to be atrophic, rather was missing altogether, further corroborating a developmental origin of the variation. Literature review yielded no observed link between gender, affected side, or location, and degree of muscular absence.

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