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Case Report

Persistent Median Artery With a Reversed Palmaris Longus and Volar Ganglion



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Being aware of the variants of upper extremity anatomy is of utmost importance to a surgeon. This case report describes a patient who presented with two separate wrist masses. Operative exploration was planned, and both the structures were investigated. The distal mass was identified as a volar wrist ganglion, and the more proximal mass was identified as the muscle belly of a reversed palmaris longus muscle. Incidentally, it was noted that the patient had a patent, persistent median artery. Although many variants of the palmaris longus have been described, as have been cases of a persistent median artery, both have not been previously documented in a single patient. Although this is rare, having knowledge of possible anatomic variations is valuable for any surgeon operating on the upper extremity.

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The current understanding is that the median artery involutes early during human development, and therefore, its presence in adult subjects is considered a variant of normal anatomy. The presence and frequency of an anomalous median artery have been debated upon. Rodríguez-Niedenführ et al¹ reported this anatomic variant in 20% of their studied cadavers, indicating that this artery may be more prevalent than what conventional teaching dictates. Further evidence of the presence and viability of this vessel was reported by Davidson and Pichora,² who used this vessel as an axial supply for a volar forearm fasciocutaneous free flap. Although the presence of this structure has been documented, few studies to date have reported an association between a persistent median artery and other accessory structures.^{1,3} No studies have demonstrated a remnant median artery with the reversed variant of the palmaris longus.

The palmaris longus is the muscle with the most documented variants worldwide.⁴ Reimann et al⁵ reported the variants of the palmaris longus in 9% of 1,600 cadaveric specimens. The variants presented as duplicate, reversed, intermediate, digastric, bifurcate,

triplicate, or absent. Georgiev et al⁶ dissected 112 upper limbs and found these variations in the palmaris longus in only 9 cases (8.04%). For these 9 cases, they reported the occurrence of each variant: absent (2.68%), reversed (0.89%), digastric (0.89%), intermediate (1.79%), and duplicate (1.79%). The presence of anomalies in the palmaris longus has also been associated with the production of compressive symptoms of the median and ulnar nerves.^{7,8} Numerous case reports and anatomic studies have documented the presence of anomalies in the palmaris longus, but only 1 was associated with a soft tissue mass, and none was associated with a persistent median artery.⁹ We report a case that presented with 2 volar masses in the wrist. Of these, the proximal mass was found to be the anomalous, reversed variant of the palmaris longus, and the distal mass was identified as a symptomatic volar ganglion. Incidentally, we also identified a persistent median artery. Written informed consent was obtained from the patient for the publication of this case report and accompanying images.

Case Report

A 44-year-old, right-handed, healthy man with no prior hand surgery or trauma presented to the clinic with 2 volar masses in the right wrist (Fig. 1). The first, more proximal mass had been present since the age of 10 years and was assumed to be a “cyst.” The patient reported that this mass had not significantly increased in size

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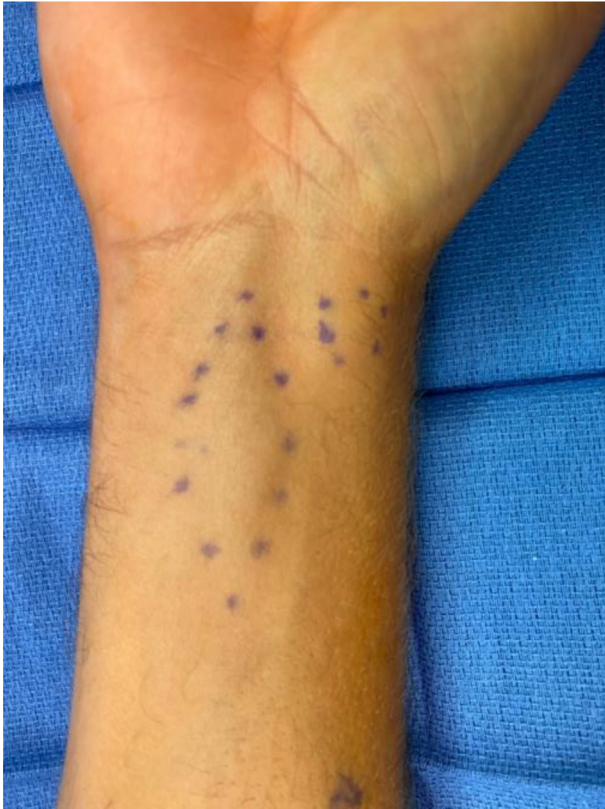


Figure 1. Preoperative preparation demonstrating 2 adjacent volar wrist masses.

and rarely bothered him, except with occasional pain due to direct impact on the mass. The second, more distal mass was new, firm, tender, and painful with repetitive motion of the wrist. He denied any paresthesias in the right hand and demonstrated no Tinel sign in the wrist. Magnetic resonance imaging was prescribed, given the presence of multiple masses, which suggested the distal mass to be a ganglion but could not rule out the possibility of a synovial cyst, vascular lesion, or soft tissue tumor. On the magnetic resonance imaging scan, the more proximal lesion demonstrated a normal muscle signal corresponding to the muscle belly of a reversed palmaris longus observed during surgery, whereas the tendinous portion of the muscle demonstrated signals and characteristics similar to those of the surrounding flexor and extensor tendons (Fig. 2). Given the size and location of the muscle adjacent to the symptomatic mass, the decision was made to surgically explore both the sites.

A Z-shaped incision overlying the distal wrist mass was designed in the operating room. Dissection was performed through the subcutaneous tissues until the cystic-appearing mass was identified. This mass was densely wrapped between the radial artery and vena comitans. Care was taken to preserve these vessels, and once freed, dissection was continued deep toward the radiocarpal joint, where the cystic mass was found to originate. It was amputated at its stump with a small window of the volar wrist capsule and sent to the pathology department.

Attention was then turned toward the proximal mass, where a longitudinal incision was made over the central prominence. Dissection was performed through the subcutaneous tissues and deep to the antebrachial fascia until muscular tissue was identified (Fig. 3). The intraoperative retraction of this muscle

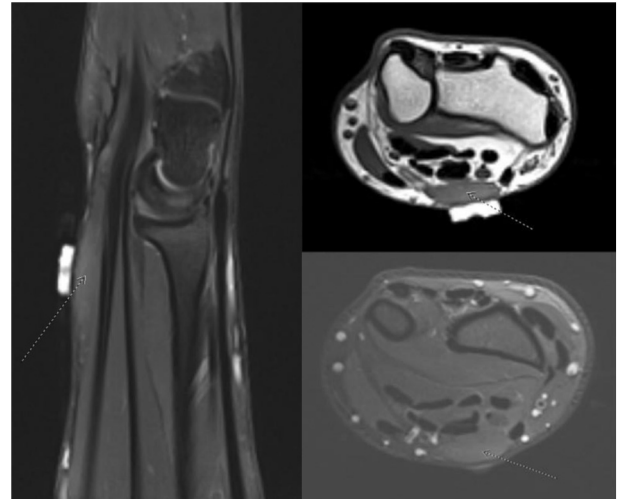


Figure 2. Sagittal and coronal magnetic resonance images demonstrating the muscle belly of the reversed palmaris longus (white arrows).

resulted in visible flexion of the wrist, suggestive of a reverse variant of the palmaris longus muscle. This finding was consistent with the natural anatomic variant. The muscle appeared healthy, and there was no visual concern for malignancy. Given the asymptomatic nature of the mass, the decision was made to leave it in situ. A small biopsy of the muscle mass was obtained for pathology.

Of additional interest, just radial to this muscle mass, the median nerve was identified, which appeared to be healthy. On the ulnar aspect of the variant of the muscle, a patent large-caliber artery was identified. It was radial to the ulnar vessels, and given its caliber and location between the radial and ulnar arteries, it was identified as a persistent median artery (Fig. 4). After a thorough examination, the incisions were closed. Pathology confirmed the suspicion of a volar ganglion and normal muscle tissue.

Discussion

Few articles have addressed the presence of more than 1 simultaneous anomalous variant in the upper extremities; however, the linked embryogenesis of these structures does support the possibility of multiple anomalies in the same extremities. The description of the formation of the vascular bed by Mrázková¹⁰ as being related to differentiating muscular tissue in the forearm and hand offers some insight into the ontogeny of blood vessels in the upper extremities in humans and provides 1 possible explanation for how these adjacent muscular and vascular structures could present as simultaneous aberrancies because their development seems to be linked.

Barbe et al⁷ reported the prevalence of anomalous structures in the carpal tunnel, but most of these were limited to a single anomaly. Lindley and Kleinert³ performed 856 carpal tunnel releases and evaluated 30 patients (5.7%) with anatomic variants of nearby structures. Of these 30 patients, only 1 patient had 2 adjacent anomalies: a high bifurcation median nerve and an accessory superficialis. In the present case, we identified a reversed palmaris longus with a persistent median artery; neither of these would have been identified without the simultaneous presence of the symptomatic mass in the wrist, which prompted the surgical intervention and provided an opportunity for exploration. After the



Figure 3. Dissection revealed the presence of the muscle belly of the reversed palmaris longus at the location of the larger mass.

reversed palmaris longus was identified during operative exploration, a patent persistent median artery was incidentally found. Rodríguez-Niedenführ et al¹ reported the variable course of the median artery as passing in front of the anterior interosseous nerve in 8 cases (67%), behind it in 3 cases (25%), and piercing it proximally in 1 case (8%) while distally piercing the median nerve from the posterior aspect to the anterior aspect in 12 cases (41%). These anomalies might be more common than previously reported because most are likely to be asymptomatic and go undiagnosed or, like this report, are identified incidentally. Nonetheless, awareness of the existence of such anomalies—especially the possibility of multiple aberrancies, including patent vascular anomalies—prepares the surgeon for anything encountered in the operating room.



Figure 4. The presence of a persistent median artery was found adjacent to the muscle belly of the reversed palmaris longus (white arrow).

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