

# Incidentally Detected McCleery Syndrome during Handheld Breast Ultrasound

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## Abstract

**Background:** The goal of our study is to identify the prevalence of McCleery syndrome and categorize its clinical manifestations in patients who obtained a diagnostic breast ultrasonography at our clinic. **Methods:** Five thousand four hundred and twenty cases were reviewed in our clinic for diagnostic breast imaging between May 2021 and May 2022. Five thousand three hundred and two of the cases were female, while 118 were male. Duplex Doppler scanning was used to assess the subclavian vein and the axillary venous structures. The same radiologist performed all examinations; in cases where suspicion was warranted, a second radiologist's opinion was acquired. The diagnosis was confirmed by consensus. **Results:** In 52 cases, McCleery syndrome was identified. Between the ages of 36 and 54 years, the average age was 47 years. In four of the patients, magnetic resonance venography supported the diagnosis. In most cases, McCleery syndrome was unilateral. In only two cases was it bilateral. The incidence of McCleery syndrome was 0.95% in our study. Pain was the most often reported symptom (53.8% of 28 cases). No symptoms were reported in 26.9% of the patients. **Conclusion:** During a breast ultrasound, radiologists should be aware of McCleery syndrome while assessing the axilla.

**Keywords:** Breast ultrasound, McCleery syndrome, thoracic outlet syndrome

## INTRODUCTION

Thoracic outlet syndrome (TOS) can be divided into three subgroups: neurogenic, arterial, and venous TOS (vTOS) according to its etiology. A type of vTOS, McCleery syndrome is caused by compression of the subclavian vein without thrombosis. It was described in detail by McCleery *et al.* in 1951.<sup>[1]</sup> In pathology, there is compression of the subclavian vein between the first rib, the clavicle, subclavius tendon, and anterior scalene muscle.<sup>[1]</sup> There is not a real thrombosis in axillary and/or subclavian veins similar to that found in Paget-Schroetter syndrome.<sup>[2]</sup>

Etiology includes factors that contribute to the compression of the subclavian vein at the level of the costoclavicular space. Anatomical abnormalities or variants, deep-venous thrombosis, bone and soft-tissue abnormalities, and fibrosis can cause McCleery syndrome. Our main goal in imaging is to rule out an underlying abnormality.<sup>[1,3,4]</sup> Patients with

McCleery syndrome have a higher risk of developing upper extremity deep vein thrombosis when the subclavian vein is intermittently compressed.<sup>[5]</sup>

McCleery syndrome may present with swelling of the fingers, hands, and arms, paresthesia, discoloration, diffuse pain, edema as well as weakness of the neck and arms. While the described symptoms disappear in the bed rest and elevation position, they may reappear or increase during activity. Symptoms may also worsen in the overhead position of the arm.<sup>[1,3]</sup> Sometimes patients may be asymptomatic.

Handheld ultrasound (US) examination is typically performed with the patient in the supine position with the ipsilateral arm raised under her/his head to view the axillary region optimally

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Received: 21-04-2024 Revised: 07-07-2024 Accepted: 21-07-2024 Available Online: 18-01-2025

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DOI:  
10.4103/jmu.jmu\_46\_24

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**How to cite this article:** Arslan A, Göldoğan N, Fidancı Ö, Balkanlı B. Incidentally detected McCleery syndrome during handheld breast ultrasound. J Med Ultrasound 2025;33:248-52.

and with a pillow placed under the shoulder (arms in abduction position). In some cases, we observed a pseudo-thrombosed appearance in the subclavian vein and axillary vein during breast imaging, but this appearance completely disappeared in the neutral position (arms in adduction position).

The aim of our research is to determine the incidence of McCleery syndrome and classify its clinical findings in cases who applied to our clinic for diagnostic breast US between May 2021 and May 2022.

## MATERIALS AND METHODS

Between May 2021 and May 2022, 5420 cases applied to our clinic for diagnostic breast imaging. One hundred and eighteen of the cases were male and 5302 were female. Our prospective study was conducted in accordance with the Declaration of Helsinki and was approved by Ümraniye Training and Research Hospital Clinical Research Ethics Committee (approval number 2021-194) and signed informed consent was collected from all subjects.

Exclusion criteria from our study: patients who had previously operated on the axillary region (patients who had lymph node dissection due to breast CA), patients with a central venous catheter or port, malignancy, or family history of thrombophilia. A total of 12 cases were excluded from our study.

First, the axillary region was evaluated with a grayscale US (Aplio i800 Imaging, Canon Medical Systems). Axillary venous structures and subclavian veins were evaluated, followed by flow assessment using duplex Doppler scanning. All examinations were performed by the same radiologist; the second radiologist's opinion was obtained in suspicious cases. Consensus was reached on the diagnosis.

In our study, the positive diagnosis of McCleery syndrome was made mainly by grayscale and duplex US. First, we characterized the appearance of suspected thrombosed vessels in abduction (the patient is supine, with the ipsilateral arm over the patient's head). We evaluated whether there was a response to compression. We then evaluated the absence of blood flow using color Doppler ultrasonography. Later, when the patients moved to the neutral position, we observed that the findings resolved within minutes and there was no real thrombosis. We observed that McCleery-positive cases showed the same sonographic findings at different times.

*Magnetic resonance angiography (MRA)* was performed with a 1.5T magnetic resonance (MR) scanner (Siemens Healthineers, Magnetom Aera, Erlangen, Germany, or Siemens Healthineers) using either Gadovist (0.1 mL/kg) as a contrast agent. Regional anatomy and vascular anatomy were evaluated with contrast-enhanced MRA. First, the neutral and then the adduction position were examined. Diagnosis was confirmed by MRA examination in only four cases due to the difficulty of dynamic examination and artifact. High-resolution T1-weighted and T2-weighted sequences in sagittal and axial planes, Contrast-enhanced three-dimensional MR venography

with fat suppression and subtraction images were obtained. MRA images were evaluated together by two radiologists. The data were collected and analyzed through a traditional Excel database (Microsoft, Redmond, WA, USA).

## RESULTS

McCleery syndrome was detected in 52 cases. All the McCleery syndrome cases were female. The diagnosis was confirmed by MR venography in four of the cases. McCleery syndrome was unilateral in most cases. It was bilateral in only two cases. In our study, we found the incidence of McCleery syndrome 0.95%.

In addition, cases with McCleery syndrome were categorized according to their symptoms. The most common complaint was pain (53.8%, in 28 cases). The pain was usually mild to moderate and intermittent. This was followed by intermittent swelling of the arm and limitation of movement. There were no symptoms in 26.9% of the cases (14 cases) [Table 1]. The average age was 47 years; ranging from 36 to 54 years old.

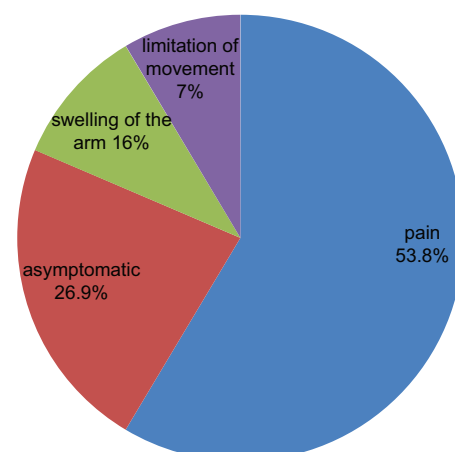
Primarily, we characterized the vessel and identified the presence of thrombus by gray scale ultrasonography. We evaluated whether there was a response to compression. Afterward, we evaluated blood flow with color Doppler ultrasonography. In some cases, we have evaluated the diagnosis with contrast-enhanced MR angiography.

## Illustrative case

A 60-year-old female patient applied to our clinic due to routine breast cancer screenings. In the mammography examination; Except for dense breast parenchyma, no findings suggestive of malignancy, mass with spiculated contours, and suspicious microcalcification cluster were detected in both breasts.

In the US examination, both breast skin thicknesses are natural, and subcutaneous fat planes are clear. There was no finding suggestive of malignancy. However, incidentally, during the control of the left axillary region, slow flow was observed in

**Table 1: Clinical manifestations of McCleery syndrome**



the left axillary vein, subclavian vein, and brachial vein in the 1<sup>st</sup> sec during abduction; after 1 min, lumen echogenic and thrombosed appearance was observed in the venous trace, and no flow was detected in Doppler US at this stage [Figures 1-5].

When the left arm was brought to the neutral position from abduction, the vascular flow was normal [Figure 6]. When the patient was questioned, it was learned that he had congestion and intermittent recurrent pain in the left arm. It was learned that there was no known musculoskeletal pathology in the left arm. It was thought to be compatible with McCleery syndrome and was referred to the MRA [Figure 7].

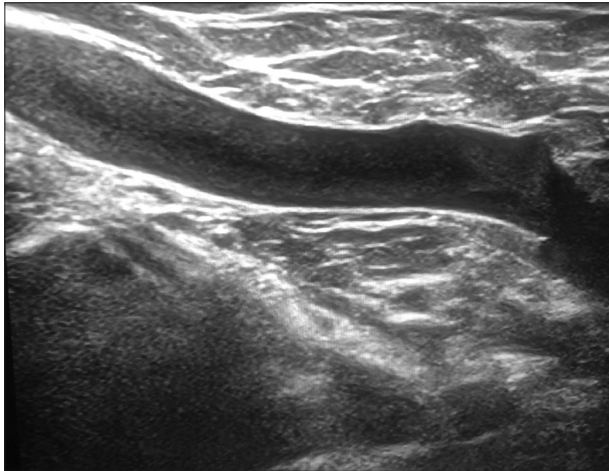
## DISCUSSION

vTOS is the most common after the neurogenic type. In most cases, it presents with spontaneous thrombosis of the axillary and/or subclavian veins (also known as Paget-Schroetter

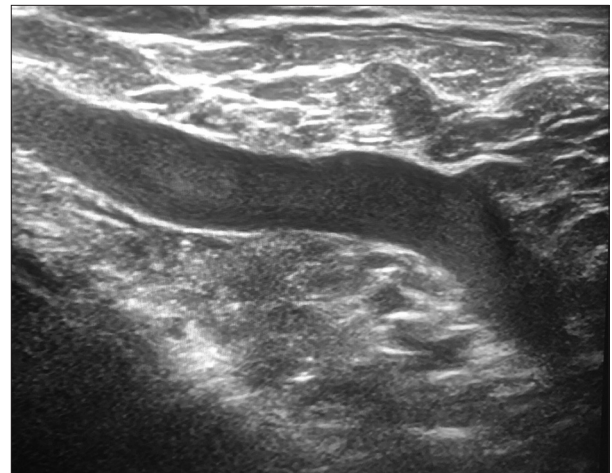
syndrome). However, in some cases, symptoms may present secondary to intermittent venous compression without thrombosis (McCleery syndrome).<sup>[5]</sup>

According to literature reviews, vTOS usually develops in young, healthy adults and usually has no comorbidities. It also has a similar gender distribution.<sup>[6]</sup> In our study, we observed this syndrome frequently in young, asymptomatic healthy adults. Although McCleery syndrome is mostly bilateral in the literature, we observed that it was mostly unilateral in our study. Similar to the literature, we observed compression most frequently in the costoclavicular region.<sup>[5,7]</sup>

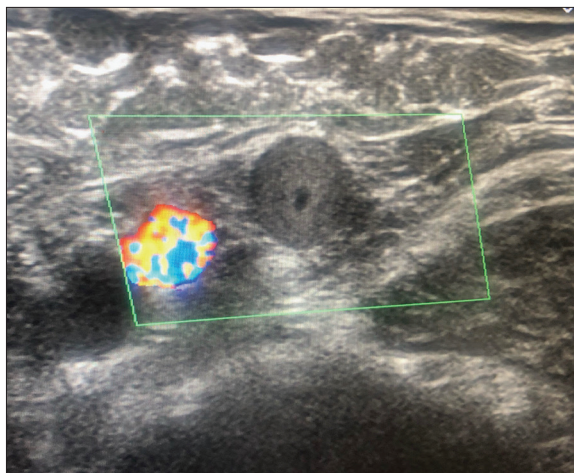
TOS variants may coexist. In our study, we evaluated the subclavian and axillary arteries. However, we did not observe arterial TOS in any of the cases. Vascular examinations are of limited diagnostic value in isolated neurogenic TOS (nTOS) type. Electroneuromyographic signs are required to support the diagnosis of nTOS type. Therefore, we could not evaluate the neurogenic form.<sup>[8,9]</sup>



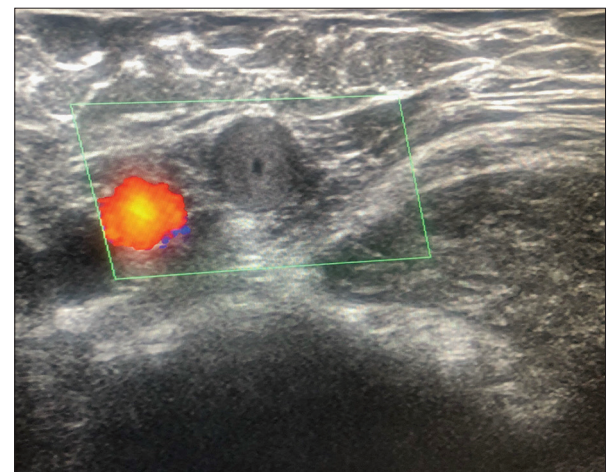
**Figure 1:** Grayscale ultrasound examination of the axillary vein in the abduction position at 15 s, a slight echogenicity started in the vascular lumen



**Figure 2:** Grayscale ultrasound examination of the axillary vein in the abduction position at 20 s



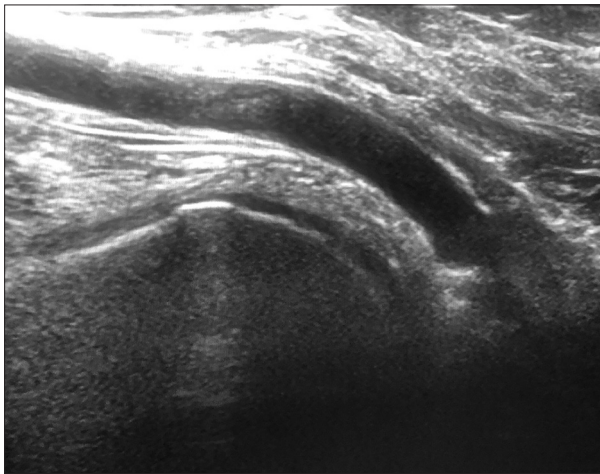
**Figure 3:** Color Doppler ultrasound examination of the axillary vein in the abduction position at 50 s, an increase in echogenicity consistent with pseudo-thrombosis was observed in the lumen. There was no response to compression



**Figure 4:** Color Doppler ultrasound examination of the axillary vein in the abduction position at 55 s. No vascular flow was observed in the axillary vein



**Figure 5:** Grayscale ultrasound examination of the subclavian vein in the abduction position. No vascular flow was observed in the subclavian vein. There was no response to compression



**Figure 6:** Grayscale ultrasound examination of the brachial vein in the neutral position. The echogenicity is markedly decreased in brachial vein



**Figure 7:** Contrast-enhanced magnetic resonance MR angiography (MRA) (venous phase) of the patient's abduction position shows that the contrast filling of the left subclavian vein is quite low compared to the right (subclavian vein above and subclavian artery below)

When the literature is searched; the incidence of McCleery syndrome is entirely unknown, and prior reports have poor face validity. In the study of Illig *et al.*, McCleery syndrome was detected in 18 of 526 cases (3.42%) who were referred with suspicion of TOS.<sup>[10]</sup> The expected incidence of symptomatic TOS is 10 per 100,000.<sup>[11]</sup> Since our study was a random population work-up, our incidence was lower (0.95%). In 26.9% of our cases, there was no suspicious symptom in terms of TOS.

Doppler US is the recommended initial test for diagnosis of McCleery syndrome. It is important to remember that the subclavian vein can be difficult to see as it passes via the costoclavicular junction, which could obscure a potential thrombus. The axillary and brachial veins, as well as the subclavian vein, should be carefully evaluated. There are other imaging methods, including MR venography and computed tomography (CT) venography. CT venography is not primarily preferred because of contrast agent and radiation. In MR venography, due to possible artifacts in dynamic examination and high cost, it could not replace Doppler US primarily. Due to potential artifacts in dynamic examination and the high cost, Doppler US could not completely replace MR venography.<sup>[12]</sup> In the initial imaging and follow-up imaging for vTOS, the ACR guidelines recommend catheter venography upper extremity, US Duplex Doppler subclavian artery and vein, CT chest with IV contrast, and chest radiography. It is crucial to keep in mind that further cross-sectional imaging studies may be critical for understanding the underlying pathology of vTOS, such as Pancoast tumor or cervical spondylopathy.<sup>[13]</sup>

There are some limitations of our study. First, we could not perform MR venography with all of our cases because of the cost-effectiveness and possible artifacts. We could not examine the regular follow-up examination and treatment scheme of the cases. Since the majority of our cases were women, the distribution of men and women could not be made objectively. The cases also could not be evaluated in terms of nTOS by electroneuromyographic examinations. The strength of our study is that it is the first study to be conducted randomly in terms of vTOS with a high patient population.

## CONCLUSION

McCleery syndrome causes false thrombosis in subclavian and axillary veins, which is seen in 0.95% of our population. Doppler US is used primarily for diagnosis. CT-venography and MR-venography are used when necessary. Although it presents with pain in most of the cases, it may be asymptomatic in some. Radiologists should keep McCleery syndrome in mind when evaluating the axilla during breast US.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. McCleery RS, Kesterson JE, Kirtley JA, Love RB. Subclavius and anterior scalene muscle compression as a cause of intermittent obstruction of the subclavian vein. *Ann Surg* 1951;133:588-602.
2. Alla VM, Natarajan N, Kaushik M, Warriar R, Nair CK. Paget-schroetter syndrome: Review of pathogenesis and treatment of effort thrombosis. *West J Emerg Med* 2010;11:358-62.
3. Hu J, Biederman R, Kashyap K, Wilson JT, Farah V, Franco T, *et al.* Duplex ultrasound in the evaluation of venous and arterial thoracic outlet syndrome. *JRSM Open* 2021;12:2054270420983101.
4. Raptis CA, Sridhar S, Thompson RW, Fowler KJ, Bhalla S. Imaging of the patient with thoracic outlet syndrome. *Radiographics* 2016;36:984-1000.
5. Allam AK, Ismail MI, Rizk MA. McCleery's syndrome the overlooked cause of swollen upper limb, completion venoplasty is the key word for successful surgical decompression. *Egypt J Hosp Med* 2021;85:3790-7.
6. Urschel HC Jr., Razzuk MA. Paget-Schroetter syndrome: What is the best management? *Ann Thorac Surg* 2000;69:1663-8.
7. Baz AA. An overview of the findings of dynamic upper limbs' arterial and venous duplex in cases of vascular thoracic outlet syndrome. *Egypt J Radiol Nucl Med* 2019;50:1-11.
8. Novak CB, Mackinnon SE, Patterson GA. Evaluation of patients with thoracic outlet syndrome. *J Hand Surg Am* 1993;18:292-9.
9. Laulan J, Fouquet B, Rodaix C, Jauffret P, Roquelaure Y, Descatha A. Thoracic outlet syndrome: Definition, aetiological factors, diagnosis, management and occupational impact. *J Occup Rehabil* 2011;21:366-73.
10. Illig KA, Rodriguez-Zoppi E, Bland T, Muftah M, Jospitre E. The incidence of thoracic outlet syndrome. *Ann Vasc Surg* 2021;70:263-72.
11. Thompson JF, Jannsen F. Thoracic outlet syndromes. *Br J Surg* 1996;83:435-6.
12. Moore R, Wei Lum Y. Venous thoracic outlet syndrome. *Vasc Med* 2015;20:182-9.
13. Expert Panels on Vascular Imaging, Thoracic Imaging, and Neurological Imaging, Zurkiya O, Ganguli S, Kalva SP, Chung JH, Shah LM, *et al.* ACR appropriateness criteria® thoracic outlet syndrome. *J Am Coll Radiol* 2020;17:S323-34.