

Small Steal, Big Deal! : Arterial Thoracic Outlet Syndrome

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Abstract

Arterial Thoracic Outlet Syndrome is one of the types of thoracic outlet syndromes caused by compression of large arteries between the clavicle & first rib. The predominant causes involved are usually repetitive injuries/sports injuries, motor-vehicle accidents or certain anatomical defects like an extra rib. Patients present with a varied set of non-specific complaints ranging from pain in the neck/shoulder/arms, numbness/tingling of fingers, limb weakness or discoloration, etc. Physical rehabilitation & thrombolysis remains the mainstay of the treatment. Prevention is of course better than the treatment.

Keywords: Arterial Thoracic; Outlet Syndrome; Trauma; Thrombolysis.

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Introduction

Thoracic Outlet Syndrome (TOS) is a rare syndrome of non-specific symptoms comprising of compression/injury/irritation of the neurovascular bundle in the thoracic outlet space i.e. between the clavicle & the first rib, thus deriving its name. Therefore, it can be classified as-

1. Neurogenic Thoracic Outlet Syndrome (Most Common)
2. Arterial Thoracic Outlet Syndrome (RAREST) (<1% cases)
3. Venous Thoracic Outlet Syndrome.

Age and Gender remains no bias.

It is most commonly seen in athletes involved with repetitive overhead motions of arms & shoulders like volleyball/ basketball players or swimmers however, other causes implicated could be-

1. Motor-vehicle accidents leading to Whiplash injuries

2. Large muscle mass in body-builders/morbidly obese patients
3. An extra rib i.e. Cervical rib
4. Rarely, tumors of the neck
5. Poor posture/ pregnancy.

TOS, due to its non-specific symptoms, is usually diagnosed late & neglected by many. A spectrum of the following symptoms have been observed-

- Pain in the neck, shoulder, arm or upto the hands
- Numbness/tingling of the fingers of the affected side
- Weakness of the arm of the affected side
- Discoloration of the affected limb/ blotchy skin
- Cold/clammy extremity of the affected side
- Cold sensitivity of the affected hand.

Making the diagnosis of TOS becomes even more difficult as a number of disorders feature symptoms similar to those of TOS, including rotator cuff injuries, cervical disc disorders, fibromyalgia, multiple sclerosis, etc. A thorough medical



history, inquiring about the patient's occupation, pre-existing co-morbidities, if any associated risk factors involved, any history of recent trauma coupled with the following signs, provocations tests & investigations can be implicated in the diagnosis of the TOS.

Signs and Provocation Tests (poor sensitivity and specificity):

Adson's Sign: loss of the radial pulse in the arm by rotating head to the ipsilateral side with extended neck following deep inspiration.

Wright's Test: hyper-abduction of the arms over the head with some extension and evaluating for loss of radial pulses or signs of blanching of the skin in the hands indicating a decrease in blood flow with the maneuver.

Compression Test: exerting pressure between the clavicle and medial humeral head causes radiation of pain and/or numbness into the affected arm.

Abnormal arterial pulsations of the affected limb
Decrease range of motion.

Investigations

X-ray: Helps diagnosing cervical ribs or bone exostosis

Duplex Ultrasound: Helps diagnosing the site of stenosis or thrombus formation

CT/MRI Angiography or Arteriography

Timely & early diagnosis is limb salvageable.

1. Physical therapy focusing mainly on the patient education, pain control, range of motion, nerve gliding techniques, strengthening and stretching have been recommended in the risk prone groups.
2. NSAID's helps decrease pain & inflammation.
3. Botulinum injections to the anterior and middle scalene muscle have also found to temporarily reduce pain and spasm from neurovascular compression. However, further research is needed due to the discrepancies in the literature.
4. In cases of radiological evidence for cervical rib, surgical resection of cervical rib with or without the excision of the first rib & scalene muscle revision should be performed to relieve the persisting neurovascular compression.
5. Subclavian vessel inspection for degeneration, aneurysm or dilatation & angioplasty or reconstruction for the same.

6. Thrombolysis however remains the definitive treatment for the arterial TOS.

Complications are rare, though embolization of the hand, brachial plexus injury during surgical decompression, risk of hemorrhage in thrombolysis, have been noted.

Prognosis is variable although with physical therapy & regular exercises in risk-prone groups, good outcomes have been observed.

Case Report:

66 yr old female patient, walked into the emergency room later during the night with C/O severe pain, numbness & bluish discoloration of the left arm since today morning.

As the patient's family recalls, she was apparently normal until 15 days back when she developed pain in her left arm following the fall of some heavy object over her shoulder. She was taken to a nearby orthopedician for the same & pain was relieved only temporarily with the treatment received.

On recurrence of the pain a week later, she was advised a chest X-ray which revealed a normal study & was prescribed an another set of symptomatic management.

However, when the pain persisted for another few days, until it became unbearable she walked into the ER for further evaluation.

Patient also C/O poor left hand grip

No H/O any previous medical illness.

On Examination-

Airway Assessment: Patent, Protected, Patient Talking

Breathing Assessment:

Respiratory Rate-14/min

Laboured - No

SpO₂-98% on room air

Circulation:

Pulse-104/min

BP-150/100 mmHg

Peripheral Pulse-absent left radial & brachial artery pulsations

Temperature-98.4 degree F

Disability:

GRBS-135 mg/dl

GCS-E4V5M6- 15/15

Pupils-B/L Reactive

ECG- Sinus Rythm

Exposure:

Afebrile

Bluish black discoloration of the left upper limb noted.

No obvious bony deformities noted.

AMPLE History:

Allergies-None

Medications-None

Past Medical History- Nothing significant

Last Meal- 3hours back

Secondary Survey:

HEENT: No pallor/icterus/clubbing/cyanosis.

CHEST: Bilateral vesicular breath sounds heard with no adventitious sounds heard

CVS: S1 S2 heard with no murmurs

P/A : Soft, non tender, bowel sounds heard.

CNS : Conscious, alert & conversant

Extremities: Left upper limb cold & clammy, whereas right Upper lib warm. No limb edema noted. Left radial & brachial artery pulsations were not palpable. Cyanosis of the left upper limb upto the nail beds noted. Left hand flexion deformity noted.

Working Diagnosis: Left peripheral vascular disease

Care Plan:

Inj. Diclofenac 75mg in 100ml NS IV stat

Inj. Pantoprazole 40mg IV stat

Inj. Ondenseteron 4mg IV stat

Inj. Ceftriaxone 1G IV stat

IV Fluids RL @100ml/Hr

Doppler Ultrasound was immediately ordered

Immediate Vascular surgeon opinion was obtained

ICU admission was planned

Routine Investigations were sent-CBC, LFT, KFT, Coagulation Profile, Blood Grouping & cross matching, HBsAg, HIV & HCV.

Chest X-Ray was ordered.

Patient was shifted to the USG room & reports were chased.

Differential Diagnosis:

Carpal tunnel syndrome

Raynaud's disease

Arterial peripheral vascular disease

Venous peripheral vascular disease

Rotator Cuff injury

Subclavian steal syndrome

Vasculitis

Investigations:

CBC:Haemoglobin-6.9, Platelet Count-1,70,000, TLC-37,000

KFT- Urea-86, Creatinine-1.43, Electrolytes- wnl

LFT- T.Bil-0.32, Direct Bil- 0.13, SGOT-1221, SGPT-1077

Coagulation Profile- PT-20.6, INR-1.82

HBsAg, HIV, HCV- Negative

Blood Group- B Positive

DOPPLER US - Proximal veins appear normal with absent distal flow in radial & brachial arteries. Advised CT angiography for further correlation

CXR s/o left cervical rib

Course In The Hospital:

After thorough history & examination, patient was initially managed with IV Antibiotics, IV Analgesics & IV Fluids. After obtaining the Doppler US report & owing to the persistent pain, CT Angiography was performed with all the risks explained to the patient & her attendants.

CT Angiography revealed-Left cervical rib with evidence of arterial thoracic outlet syndrome. There is thrombosis & complete occlusion of the left distal Subclavian, axillary brachial arteries. Poor collateral flow distally. The distal radial & ulnar arteries appear completely occluded. Proximal veins appear normal.

Immediate Cardiology & CTVS opinion was obtained. Patient was planned for thrombolysis.

Under all aseptic precautions & with all the risks explained, patient was taken to the cathlab for Peripheral angiography. Consent was obtained. PAG findings were as follows:

Left Subclavian artery ostium & proximal part-normal, near the origin of left vertebral artery, there is a large thrombus visualize occluding completely the distal Subclavian artery. Left vertebral artery ostium was also partially occluded.

Patients attendants were briefed the PAG findings & Thrombosuction with catheter-directed thrombolysis was planned. Written consent was obtained. Large chunks of thrombus aspirated with the help of pigtail catheter & Inj ACTILYSE 5mg Intra-arterial bolus was given followed by infusion @2mg/hr. Inj Heparin infusion @500U/Hr through side arm of femoral artery sheath was started. Pain management, NTG infusion as per BP recordings were continued.

Bedside ECHO Findings- LA, LV normal sized. N LV RWMA. Borderline concentric LVH. LVEF-60%. Valves appear normal. No clots, vegetations or evidence of PE noted. RA, RV re normal.

NTG infusion was tapered as per BP recordings, Heparin & Actilyse infusion was continued.

Later during the day, patient suddenly developed one episode of red coloured vomitus & oozing from arterial sheath site. Inj heparin & local site Inj Actilyse were stopped. Inj Emeset 8mg was given & inj Pntocid infusion was started. Haemostasis was achieved. Repeat set of vitals were- bp-140/100 mmHg, PR- 94/Min. Patient was now comfortable with no oozing or bleeding from any site. Coagulation markers were resent.

All labs were recollected & 24hrs later, thrombolysis was stopped. Patient was symptomatically better & haemodynamically stable. Limb movements & discoloration improved. 3days later, patient was shifted to the room. 2days later, after stabilization of the haemodynamics & sepsis control, patient was discharged home in good health on Tab Ecosprin AV 75mg with advice for regular follow-up.

Diagnosis:

Arterial Thoracic Outlet Syndrome

Conclusion & Discussion:

Some great man once said- "YOUR EYES CAN ONLY SEE WHAT YOUR MINDS MAY KNOW"

This above case report shows the arterial TOS as a syndrome of non-specific complaints hence leading to delayed diagnosis & treatment. Delay in starting the definitive treatment leads to deranged blood parameters & ongoing & worsening pain & ischemia. However, as a learned Emergency physician, keeping your minds open to the various differential diagnosis, can lead to prompt diagnosis & treatment.

Also, the easy availability of CT angiography at higher health centres, quick radiological diagnosis with a timely intervention by vascular surgeon, good outcome can be achieved.

Although, obtaining the site of thrombosis & thrombolysing alone isn't sufficient. Careful post-thrombolysis observation is of utmost necessity, as was the case in this patient.

Also, for the present event, the definitive treatment was performed but during the follow-ups with the patient, plan for surgical excision of cervical rib should also be considered for in order to avoid any future complications or recurrences.

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