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## Use of 'Low approach' femoral central venous cannulation during COVID 19 pandemic

Central venous catheterization is one of the most commonly performed procedures in intensive care units. Wearing personal protective equipment (PPE) for placing central venous catheter can make the procedure challenging because of poor visibility. Insertion of central venous catheter becomes even more difficult when the patient is in respiratory distress and is unable to lie flat on the bed. All these increase chances of error and complication rate. Most common route of central venous access are through internal jugular or subclavian veins but slight mistake can lead to grave complications like pneumothorax or haemothorax which are unacceptable in these group of patients [1]. In patients where it is difficult to cannulate internal jugular vein (IJV) or subclavian vein due to anatomical or medical reasons, we suggest ultrasound-guided 'low approach' femoral central venous access as an alternative [2]. We report a case of acute pulmonary edema secondary to rheumatic heart disease which was managed successfully with ultrasound-guided low approach femoral central venous access.

A 37 year old female with a history of rheumatic heart disease presented in intensive care with acute pulmonary edema. On physical examination she had fever, dyspnea (New York Heart Association Class IV), tachycardia and hypotension. She had an oxygen saturation of 80% on room air. Electrocardiogram showed nonspecific ST-segment and T-wave changes whereas urgent echocardiography revealed severe aortic stenosis and moderate pulmonary hypertension. The nasopharyngeal swab was taken for reverse-transcription-polymerase-chain-reaction (RT-PCR) assay to rule out COVID-19. The patient was managed for acute pulmonary edema with upright position, oxygen support, non-invasive ventilation (NIV), furosemide and morphine. This patient required urgent central venous access for starting vasopressors and further management.

As the patient was unable to lie flat on bed and multiple attempts for vascular access were already tried in the emergency department, we planned for low approach femoral access. Since RT-PCR report for COVID-19 was pending, after donning PPE kit and taking all aseptic precautions, skin over the thigh was prepared with the patient in reverse Trendelenburg position, leg abducted & external rotation at hip joint. We used ultrasound (M-Turbo, Fujifilm sonosite, Bothell, WA, USA) with a linear transducer to scan the femoral vessel at the level of the groin. Short axis view was used to identify femoral vein and was traced down to 5 cm below the inguinal ligament [Fig. 1]. By keeping the femoral vein in center of the screen, a needle was inserted from the middle of the linear probe at an angle of 30–45 degree [Fig. 2]. After successful puncture of the vein, the transducer was removed and the catheter was introduced by seldinger technique. Position of guidewire inside the femoral vein was confirmed with ultrasound by using a long axis view



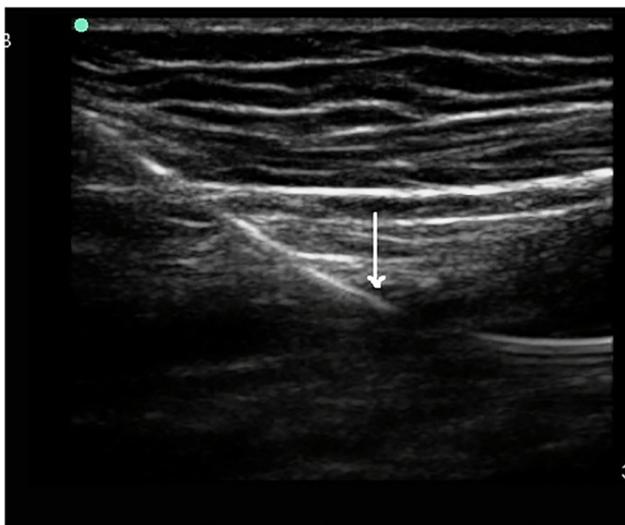
Fig. 1. Transducer placement for low approach femoral central venous access.

before threading the catheter over it [Fig. 3]. The cannulation was successful in the first attempt.

The femoral central line is not routinely used in adults mainly due to fear of high risk of catheter-related bloodstream infection (CRBSI). There is no conclusive evidence to suggest that femoral access has more risk for CRBSI [3]. In this case we successfully inserted an ultrasound guided femoral central line 5 cm below the inguinal ligament in a view to further reduce catheter induced infection rate. It has been suggested that the risk of infection will be very much reduced if we use full barrier precaution, ultrasound guidance, low approach, tunneling and medicated catheter. Another advantage of low approach femoral access is that as person doing this procedure is away from the respiratory passage of the patient it may reduce chances of airborne infection during COVID-19 pandemic [4,5]. Placing the catheter in the femoral vessel will not interfere with the respiratory care (helmet based NIV). As there is a high rate of acute renal failure in COVID-19 patients, a low approach femoral central line may be preferred while preserving IJV for haemodialysis catheter. Femoral central venous access will be a logical choice in patients with implanted chest devices, bilateral mastectomy and superior vena cava syndrome. Prone patients during mechanical ventilation and dressing of the line is also not a problem with low



**Fig. 2.** Short-axis view of femoral vein (FV) & femoral artery (FA).



**Fig. 3.** J-tip guide (arrow) visualized in long axis inside femoral vein.

approach femoral venous access. High risk of thrombosis with femoral access has been observed in some of the studies but this risk is more with the use of dialysis catheter [6]. Risk of thrombosis can be reduced by the use of ultrasound, appropriate catheter size, thromboprophylaxis, antithrombotic catheter material and timely discontinuation of the line. Femoral access should be avoided in patients with peripheral venous

and arterial disease, renal transplant and critically ill patients requiring femoral site access for extracorporeal membrane oxygenation (ECMO).

In this case we have highlighted that modification of femoral venous access helps to achieve the central access quite fast and also increases the safety of both patient and operator. We suggest that ultrasound-guided low approach femoral central venous access may be used in emergency situations & also where other options of central venous cannulation are not suitable.

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#### Declaration of Competing Interest

None.

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