



## Radiodiagnosis

## IMAGE GUIDED CHEMOPORT PLACEMENT---CHANGING TIMES: A SINGLE INTERVENTIONAL RADIOLOGY CENTRE PERSPECTIVE.

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**ABSTRACT** **INTRODUCTION:** Safe vascular access is integral to critical procedures. Chemoport implantation is a type of central venous access that was exclusively in the domain of surgeons till few years ago. However interventional radiology (IR) taking shape in our country more and more central venous access procedure is being done by radiologists and the results are almost equal or better.

**AIM:** To evaluate the technical success and outcomes of image guided percutaneous chemoport placement at a tertiary care centre.

**OBJECTIVES:**

1. To evaluate the technical success rate of the percutaneous placement of chemoports while using image guidance in a tertiary care centre.
2. To assess the intraprocedure, early & late complications of chemoport placement in these patients.

**MATERIAL & METHOD:** This prospective study was conducted on 28 subjects at a tertiary care hospital from Jul 16 to Dec 17 as per laid down inclusion and exclusion criteria. All patients were counselled prior to the procedure. Patients were taken up for chemoport placement under 2% Local anaesthesia. Ultrasonography was used as initial modality to access the IJV. Further procedure was done under fluoroscopy guidance. The patients were observed for intraoperative, early and delayed complications as per SIR guidelines.

**RESULT:** Total of 28 patients (Male=10 & Female=18) were included in the study. The technical success was achieved in 100% of cases. Per operative complication was recorded in one case (3.5%). No early or delayed complication noted.

**CONCLUSION:** Image guided chemoport placement is safe and has a high technical success rate.

**KEYWORDS :** Chemoport, Internal Jugular vein, Ultrasonography.

**INTRODUCTION:**

Safe vascular access is integral to critical procedures. There are various guidelines laid down by various societies regarding central venous access. Utilization of modern imaging tools like ultrasonography have added a new dimension to these procedures<sup>1</sup>. Chemoport implantation is a type of central venous access which till recently was exclusively the domain of surgeons. With interventional radiology (IR) taking widespread root in our country increasing numbers of central venous access procedures are being done by radiologists with results which are almost equal or better<sup>2,3</sup>. This study is a single centre armed forces institute study to evaluate the technical success as well as the complications of image guided percutaneous chemoport placement.

**AIM:** To evaluate the technical success and outcomes of image guided percutaneous chemoport placement at a tertiary care centre.

**OBJECTIVES:**

1. To evaluate the technical success rate of the percutaneous placement of chemoports using image guidance in a tertiary care centre.
2. To assess the intraprocedural, early & late complications of the procedure.

**MATERIAL AND METHOD:**

This is a prospective cross sectional study conducted on 28 subjects at a tertiary care Armed Forces hospital having a fully equipped and functional malignant disease treatment centre from Jul 16 to Dec 17. Prior consent was taken from all patients for inclusion in the study.

**INCLUSION CRITERIA:**

- All patients planned for long term chemotherapy.
- Willing for percutaneous chemoport insertion.

**EXCLUSION CRITERIA;**

- Patients with bleeding diathesis.
- Severely tachypnoic.
- Patients unable to lie supine and maintain oxygen saturation.

**Procedure Steps:** The steps for image guided percutaneous chemoport insertion were explained to the patients and their next of kin. All patients were evaluated with Doppler imaging of neck veins to rule out any anomalous course of internal jugular vein (IJV). The right IJV was

preferably punctured by default except in cases where the right chest was planned or involved in the field of surgery or radiation. The left IJV was used as the access point in the latter case or if the right JV was found occluded.

**Guidance:** All venous punctures were done using 7.5Mhz linear probe of Ultrasonography Logic P5 (Wipro GE; Milwaukee, USA) under strict aseptic conditions. Further placement of the port catheter was done using fluoroscopy as guidance.

**Anaesthesia & monitoring:** All our cases were done under local anaesthesia (2% lignocaine). Preprocedure safety check list and Intraprocedure continuous monitoring of pulse, blood pressure and oxygen saturation was done.

**Port size:** 9.6-10.3Fr (Fig 1).

**Technique:**

- The region of interest i.e. right or left side of neck and chest (as selected) was cleaned and draped.
- The IJV was punctured in its most infero lateral aspect using USG guidance (Fig 2a,b) and was cannulated with 6Fr angiographic sheath.
- A pocket was created in the chest wall (supra-mammary) with blunt dissection (Fig 3).
- The port catheter was tunnelled from the upper margin of the skin pocket till the puncture site in the JV after obtaining adequate local anaesthesia of entire planned tract.
- The catheter was internalised after measuring adequate size under fluoroscopy guidance using a peel away sheath. (Fig 4 a & b)
- The port was tested for patency using non coring needle.
- The skin pocket was closed using non absorbable suture.
- Post procedure the position of port and chest related complications like pneumo/haemothorax was confirmed with a spot chest radiograph. (Fig 5) To put fluoro image.

Following the procedure all patients were observed in the IR department for an hour. All patients were evaluated for 24 to 48hrs for early complications. Chemotherapy was initiated using the same chemoport within next 48hrs in all patients. Patients were further followed up with our oncology team for upto 30days. All our patients were intensively taught about care and possible complication of the

port in the language they best understand.

**RESULT:**

A total of 28 cases were taken up for percutaneous chemoport insertion using image guidance in the IR department. The age range was from 19-73 Yrs. Our cohort of patients comprised 10 male and 18 female patients. Carcinoma of breast formed the major subset of our clientele. Of the total 28 cases 3 cases were done on the left side while 25 cases were done on right side. All our patients were pre-evaluated with Doppler ultrasonography for patency of IJV in the neck bilaterally.

No intraoperative complication was noted in any patient. We divided post operative complications as per the guidelines laid down by Society of Vascular & Interventional Radiology (SIR) where complications were called as early if it occurred within 30days of the procedure while they were classified as late if they occurred beyond 30 days of procedure<sup>4</sup>.

The technical success of our study was 100%. All cases were successfully done under local anaesthesia with no requirement of sedation or general anaesthesia. We had a solitary incidence of accidentally slippage up of the angiographic sheath from its position from the left sided IJV cannulation during the procedure. The same was repositioned with re-puncture of IJV and the procedure was completed uneventfully.

No early complications like pneumothorax, haemothorax, haematoma formation, air embolism, wound dehiscence etc were noted in any of our cases. All our cases were followed up in oncology outpatient for a period of 3 months for delayed complication. None of our patient have reported with any delayed complications like thrombosis of IJV or superior vena cava, delayed wound infection, skin necrosis, fracture of catheter etc. None of our patient underwent port explantation (Table 1).

**Table 1: Complications (n=28)**

SL No	Per Operative	Early	Delayed
1	Bleeding : Nil	Infection : Nil	Thrombosis of IJV : Nil
2	Failure : Nil	Blockage : Nil	Skin Necrosis : Nil
3	Pneumothorax : Nil	Thrombosis : Nil	Fracture Catheter : Nil
4	Haemothorax : Nil	Leak : Nil	Port explanation : Nil
5	Breakage : Nil	Bleeding : Nil	
6	Displacement : 01		
7	Arrhythmia : Nil		
8	Mortality : Nil		

**Rates of Complications:**

**Per Operative complication:** 1/28= 3.57%

**Early Complication:** 0%

**Late Complication:** 0%

**DISCUSSION:**

Tunnelled catheters are ones which travel for a distance in the subcutaneous tissue before exiting the skin. Image guided percutaneous central venous access is a procedure where placement of a catheter is done with its tip at the cavo-atrial junction of right atrium using real time image assistance. Normally the cavo-atrial junction is two vertebral bodies below the carina<sup>5</sup>.

While physical success is defined as introduction of catheter into the venous system and placing the tip at the desired location the functional success is more important.

The indications for central venous access can be classified as under:<sup>4</sup>

**a) Therapeutic:**

1. Administration of Chemotherapy.
2. Administration of Total parenteral Nutrition.
3. Administration of blood products.
4. Administration of intravenous medications.
5. Performance of haemodialysis.

**b) Diagnostic:**

1. To monitor response to treatment.
2. For repeated blood sampling.

The complication rates for central venous access is described as 7% in literature while using image guidance<sup>6</sup>. The success rate for internal jugular vein cannulation has been described as 96% in the literature with SIR guidelines threshold being laid at 95%<sup>7</sup>. The same is correspondingly 95% (success rate) and 90% (SIR guidelines

threshold) when subclavian vein is used for cannulation for infusion ports. Literature review for associated major complications for image guided peripheral ports like pneumo/haemothorax has been reported as 0% with SIR guidelines threshold as 0%. The same for haematoma & wound dehiscence stands at 1 to 2 %. The major complication noted in literature is that of thrombosis of large veins amounting to 35 while the SIR threshold puts a cut off value at 6%<sup>4</sup>. In our study the major as well as minor complication during early as well as late period has been zero which is well below the laid down threshold SIR guidelines.

The use of local anesthesia should be adequate at the site of vascular access, site of port pocket and the tunnelling tract for the silicone tube. Usually 2% lignocaine reconstituted to 1% to increase the volume is adequate is enough to achieve this target.

Use of image guidance for vascular access has made the job easy and reduced the rate of complications. Ultrasonography being dynamic, economical, portable and user friendly is the best modality suitable for this procedure. We used 7.5 MHz or higher frequency linear probe in all our cases for initial vascular access.

The key to IJV puncture is a lower puncture as compared to the central line puncture so that the silicone catheter of chemoport need not have to traverse a longer route from chest while traversing into the thorax. This will further reduce the possibility of catheter kink leading to block.

The measurement of adequacy of length of the silicone tube to be internalised in its vascular part is critical. This can easily be done with the help of fluoroscopy. Improper measurement may cause an additional length of the catheter to flip in the right atrial chamber leading to potential complications like arrhythmias, thrombus formation etc.

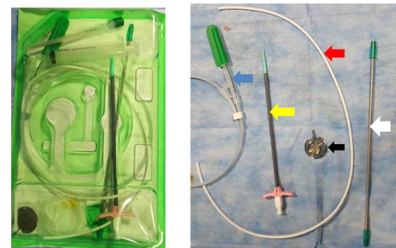
Finally the port pocket should be adequate and appropriately placed in the chest wall so that it is easily accessible to use in post procedure. Needless to mention there should be absolute asepsis during the entire procedure.

**CONCLUSION:**

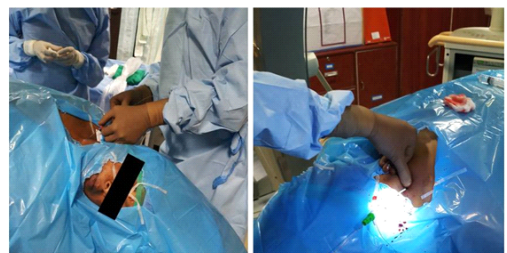
Image guided chemoport placement is a relatively simple procedure but can be associated with a host of complications if not performed correctly. This procedure is performed by oncosurgeon in the Armed Forces and image guided steps are rarely used. With few Radiology centres taking up this procedures in Armed Forces in the near future more and more cases will be done under image guidance. Our results show that under image guidance the procedure related morbidity and complications can be minimized to well below acceptable standards.

**Conflict of Interest:**

None



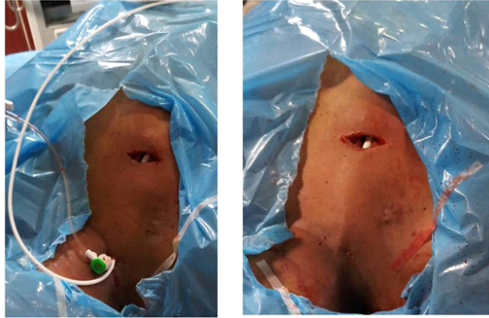
**Fig 1:** Packed and different component of chemoport. Chemoport (Black arrowhead), Blunt tunneler (White arrowhead), Silicone catheter (Red arrowhead), Peel away Sheath (Yellow arrowhead), Exchange Guide wire (Blue arrowhead).



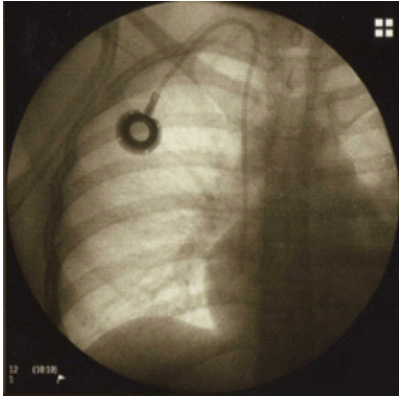
**Fig 2a & b:** USG guided cannulation of Rt IJV



**Fig 3: Pocket in the Rt chest (Black Arrow) created for chemoport**



**Fig 4a & b: Chemoport prior to complete internalisation and after complete internalisation**



**Fig 5: Post procedure spot radiograph for confirmation of position of chemoport and to rule out pneumo/haemothorax.**

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