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A Study of Haemodialysis Canula Insertion by using Seeker Needle in Internal Jugular Vein

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ABSTRACT: The percutaneous insertion of double lumen canula in Internal Jugular Vein is done initially for Haemodialysis. In rural setup and in emergency when ultrasound guidance is not feasiblethe seeker needle method can be effectively used.
In this present study we use seeker needle method with Landmark technique in 50 patients and studied the various complications and found it effective in low resource setting.
KEYWORDSSeekerneedle method, Haemodialysis canula insertion.

I. INTRODUCTION

The first step in performing Haemodialysis is the insertion of double lumen Haemodialysis canula. The same principles of central line insertion apply for the HD canula insertion. This canula provides a temporary access for high flow changes essential for Haemodialysis which can be lifesaving in Acute or chronic Kidney injury.[1]

The internal Jugular Vein, Femoral Vein and Subclavian Vein are the common veins for inserting HD canula, but the right internal jugular vein in direct line with superior vena, absence of thoracic duct and ease of insertion for right-handed operator makes it preferable for HD canula insertion. [2].

The Landmark method using two heads of Sternocleidomastoid and lateral to Carotid Artery preferably in Trendelenburgposition will help in finding the internal jugular vein. The modified Seldienger technique is used to insert the needle further into the internal jugular vein.[3]

The first choice for catheter placement should be the right internal jugular vein and the second choice should be the left internal jugular vein. Ultrasound (US) guidance has been utilized to minimize the risk of arterial puncture. Hence, National Kidney Foundation recommended real-time US to guide insertion of central venous catheters in order to increase the success rate of placement.[4][5]However, needs availability of operator and machine and its universal use is still not followed in adults.

The Ultrasonography method scores over landmark technique as exact anatomy identified, less attempts of prick, real time complications seen and the disadvantages include need for trained radiologist, difficult in unstable patient, need to shift the machinery near patient.

The experienced operators enjoy greater success rates with fewer complications. Among experienced and inexperienced operators, thenumber of needles passes correlates with the complication rate, rising significantly following two to three unsuccessful passes.[6][7]

The various complications that can arise during HD canula include Immediate and Delayed.

The immediate complications include Vascular, Pulmonary and Cardiac and surrounding structure injuries. The delayed complications include devicedysfunction and infection.[8]

Although it is shown that with less attempts with the help of Ultrasonographic guidance the number of immediate complications is reduced from 11% to 4%, The seeker needle method instead of the blind needle technique is able to produce similar results. This current study tried to study such complications using the seeker needle

II. MATERIALS AND METHODS:

This was a prospective study after ethics committee approval of the College. It enrolled 50 patients both acute and chronic kidney injury requiring Haemodialysis. Study duration period was 1 ½ years from December 2017 to July 2019 A written consent Explaining all complications of procedure was taken from patient or their relatives.

The demographics data was recorded. The duration whether acute or chronic kidney injury along with the possible aetiologies. The Complications were divided as multiple attempts to find vein, Immediate Complications and delayed (after 1 week) complications. Only Patients with

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insertions of Right or Left internal Jugular Vein HD canula were included in study.

HD canula Insertion Method:
SeekerNeedle Technique:

The patient is placed in supine or Trendelenburg position, draping and sterile environment is maintained to minimize infective complications.

The slight head rotation 30 degrees to left for right IJV canulation. Then coats of sterilsing solutions like spirit and betadine to larger area near internal jugular vein. The Hemodialysis canula set assembly is kept open. A 25 G needle is used to give lignocaine subcutaneously over large area of IJV.

Using Landmarks between both heads of sternocleidomastoid by the anterior approach in upper or mid area of triangle seeker HD canula is inserted.

In blind needle technique uses landmark technique as well.In conventional method the large 16 G needle is directly inserted palpating the carotid artery medially.

In Ultrasonography guidance method a high frequency probe is used to visualize the internal jugular vein in the short axis and long axis view at the bedside.

In seeker needle method using Landmark technique before inserting the HD canula needle of 16G the Seeker Needle is inserted, 22G 11/2inch needle is used, the carotid artery is palpated medially, at an angle of 30-45 degrees directing towards ipsilateral nipple the seeker needle inserted in skin and then gradually apply continuous negative pressure by pulling back on the plunger during advancement and withdrawal.

Vessel penetration will go unrecognized unless negative pressure is applied. Confirm an intraluminal position by visualizing the steady flow of dark blood into the syringe. Bright red or high-pressure pulsatile blood are important but imperfect clues to arterial puncture advancing and aspirating till blood flow reached. Remove assembly if bright colour pulsatile blood comes andtry again checking landmarks. The needle is advanced and withdrawn in same vector to minimize lacerations to surrounding area. The vein will be reached at around 1-3 cm from skin.

Following the localization, the large HD canula needle can be inserted taking help of direction and depth of Seeker needle and rest canula can be inserted using modified Seldinger wire technique.

The position of HD canula and any other complications were ascertained by doing a chest radiograph following the procedure and patient were followed upto 3 weeks following procedurefor complications.

TABLE 1 : Complications

Immediate	Delayed
Bleeding	Infection
Arterial Puncture	Venous thrombosis
Pneumothorax	Catheter migration
Haematoma	Pulmonary Emboli
Air Embolism	Nerve injury
Catheter Malposition	Catheter Dysfunction

Observation:

A Total of 50 patients were included in the study out of which 32 (64%) were males and 18 (16%) were females. He average Age in Males was 55.3 years and in females 57.6 years.

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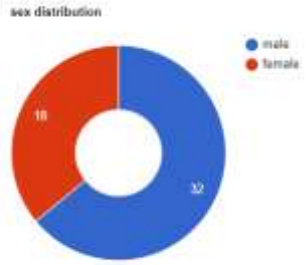
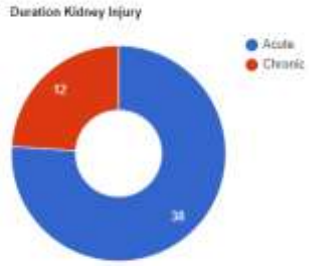


FIGURE 1 Male and Female Distribution

Out of the total Patient HD canula access 38 (76%) were patients with Acute Kidney Injury and 12 (24%) with Chronic Kidney Injury

FIGURE 2 Duration of Kidney Injury



The commonest etiology for renal failure requiring Haemodialysis was Urinary Tract Infection 21 patients (42%), Urological Problem 13 patients (Ureteric stones, Benign prostatic hyperplasia or Carcinoma Cervix, Stricture Urethra) 26 % of patients. Cardio Renal syndrome was present in 5 (10%) patients. Polycystic Kidney disease in 2 patients (4%.). In 14 patients no specific cause could be found (28%). Among the risk factors Diabetes Mellitus was present in 34 patients (68%) and 16 patients had past history of Hypertension (32%)

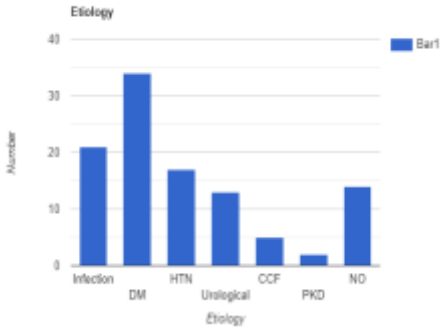


FIGURE 3: Aetiology and Risk factors of Renal injury.

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Out of the total 50 patients 43patients
(86%) had insertion in the right internal jugular vein and 7 patients (14%) in the left internal jugular Vein.

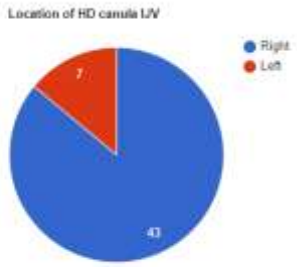

FIGURE 4 Location of HD canula

The complications are presented in Table 2

The most common problem was multiple attempts of seeker needle method to localise Internal jugular vein specially in Acute kidney injury Average attempts of 2.2 compared with Chronic Kidney injury HD canular insertion of 1.8. The average attempts of seeker needle for finding IJV overall were 2.1.
The arterial Puncture by seeker needle was seen in 5 patients (10%) and out of 5 two patients Progressed to hematoma formation (4%).

There was no complication of pneumothorax, Air embolism or catheter
Malposition (0%)
In delayed after 1 week.
3 Haemodialysis canula (6%) had catheter dysfunction and flow problems in dialysis and had to be newly introduced.
There were no problems of Pulmonary embolism 0%, Infection 0%, Nerve dysfunction 0%

Complications	Number
Multiple Attempts	2.2
Arterial Puncture	10%
Catheter Dysfunction	6%
Haematoma	4%
Other Complications	0 %

TABLE 2 : Complication subtypes.

III. DISCUSSION:

In our case of seeker needle technique the first attempt of HD canula insertion inRight Internal jugular vein was successful in 86% cases. In blind needle technique he first attempt ranges from 60-70% [9] and with ultrasonographic guidance it is usually 95-98%. [10]

In seeker needle method attempt to find the vein the mean attempts were 2.2 in our study whereas in the blind landmark technique chances of more than 3 attempts and USG guidance attempts require to canulate are definitely less. [11]

The incidence of arterial puncture in our study was 10% . In comparision with blind technique the arterial puncture in carotid artery from other studies the incidence is 10.6-13% whereasUSG guidance HD canula insertion from other studies it is 1.1%.[12]

In our study the hematoma formation was 4%. Other various other studies have shown haematoma formation of 8 -9% in blind needle technique and USG guidance studies of 0-1%.[13]

The complications of pneumothorax were 0 % and with studies on blind needle puncture it is

reported up to 4.6 % and 0-0.1 % in studies with USG Guidance.[14]

IV. CONCLUSIONS & LIMITATIONS OF STUDY

We recommend the Seeker needle method over the blind technique of Haemodialysis canula insertion as being convenient and causing reduced complication. The seeker needle method of HD canula insertion causes more chances of arterial puncture and hematoma and other complication rates are similar to Ultrasound guided Hemodialysis canula insertion.

The limitation of the study was the sample size was small and of a single institute. There is a lot we could say about the need for variable valve timing. This design is very realistic for the future of the automotive industry as well as our education.

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