

External jugular vein cannulation by central venous catheter in a buffalo

R. M. Mishra¹, K. Sharma², S. K. Ravi¹, D. Jena³ and V. Kumar^{3*}

¹Department of Veterinary Gynaecology and Obstetrics, Faculty of Veterinary and Animal Sciences, Rajiv Gandhi South Campus, Banaras Hindu University, Barkachha, Mirzapur - 231 001, Uttar Pradesh, India; ²BVSc and AH Intern student, Faculty of Veterinary and Animal Sciences, Rajiv Gandhi South Campus, Banaras Hindu University, Barkachha, Mirzapur - 231 001, Uttar Pradesh, India; ³Teaching Veterinary Clinical Complex, Faculty of Veterinary and Animal Sciences, Rajiv Gandhi South Campus, Banaras Hindu University, Barkachha, Mirzapur - 231 001, Uttar Pradesh, India

Abstract

The present report describes the placement of a Central Venous Catheterization (CVC) in a buffalo. This catheterization is one of the rarest procedures in buffalo. Intravenous catheters are excellent choice for providing long term fluid therapy, medications and constant rate infusions (CRIs) like in severe debilitated animal, cases of emergency and anaesthesia. Selection of an access point is multifactorial, while catheter material and lengths vary but there is no dramatic difference in overall performance for bovine patients. Maintaining sterility and regular flushing of the pathway is essential for longevity of a CVC.

Keywords: Anaesthesia, Bovine, CVC, Emergency

Highlights

- CVC is helpful in long-term fluid replacement or blood collection procedure
- It is the rarest procedure in large breeds of bovine
- This procedure includes less trauma and suffering for frequent collection of blood
- It describes the intricate system in central venous catheter insertion

A central venous catheter (CVC) is a huge diameter catheter that is positioned in the big central vein specifically jugular vein (Kolikof et al., 2023) (Fig.1A) or marginal vein for long term to minimize multiple venipunctures for several trials (Nagy, 2019), including central venous pressure monitoring, blood sampling, parenteral nutrition, and intravenous fluid and hypertonic solution administration (Larsson et al, 2015; Williams & Linklater, 2015; Herlihy et al., 2024). A central venous catheter is a thin, elastic cylindrical tube (Fig.1B) that is implanted into vein for administration of intravenous fluid, strictly intravenous drugs, blood transfusion and chemotherapy. Central venous catheter

insertion is a standard protocol for critically unfriendly patients. These are large bore catheter with multilumen so that numerous fluids can be administered simultaneously (Table 1). The most common site for placement is external jugular vein in equine and bovine and auricular vein in bovine.

Larger vessels favour longer duration of catheter placement and larger as well as more rapid fluid volume administration. In addition, hypertonic solutions or reactive drugs will have less risk of side effects in a larger vessel. Total parenteral nutrition (TPN) can also be delivered via central vein considering proximal location in the neck away from the flexion that occurs at rest, as this will limit the blood flow.

In adult Bovine 5.5-inch catheters are ideal, as the length limits the risk that it may be pulled out during normal movement and handling. Ten to sixteen gauges will easily provide adequate rapid

Table 1. Different types of central venous catheter and its characteristics features

Particulars	Silicone	Polyurethane	Polyethylene	Teflon/PTFE
Internal Diameter	Thick wall Small ID	Thin wall Large ID	Thick wall Small ID	Thick wall Small ID
Stiffness	Soft	Softens when warmed	Stiff	Stiff
Ease of Insertion	More difficult	Moderately easy	Easy	Easy
Flexibility	Excellent	Moderate	Rigid	Rigid

*Corresponding Author, E-mail: veter.vk134@bhu.ac.in

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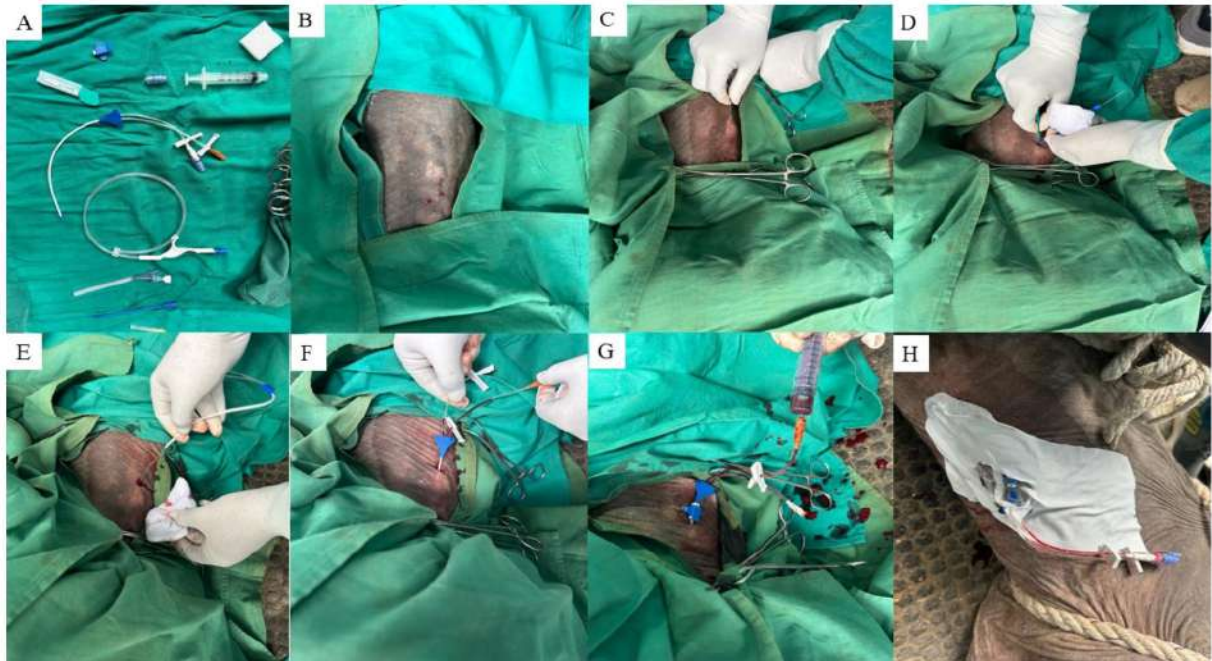


Fig. 1. Central venous catheter (CVC) cannulation in a 5-year-old female Bhadawari buffalo. A. Parts of Central venous catheter, B. Disinfection and preparation of incision site, C. Engorgement of jugular vein by pressing jugular furrow, D. Jugular venipuncture, E. Introduction of Y-type introducer Needle (18 G x 70 mm), F-G. Collection of blood post-catheterization, H. Suturing and stabilization of CVC post collection of blood



Fig. 2. Fixation and collection of blood by central venous catheter. A - Stabilization of CVC for collection of blood; B - Collection of blood through CVC

high-volume fluid flow. For neonates/calves 3.25-inch catheters with 16-18G is ideal.

A five years old female buffalo of Bhadawari breed was selected for the CVC cannulation in Instructional Livestock Farm Complex, Faculty of Veterinary and Animal Sciences, Banaras Hindu University for collecting multiple blood samples under humane method. External jugular venipuncture was finalized for cannulation. A double lumen 7 ft, 5.5 inch (CENTRO CVC KIT with soft J Tip guidewire, GS-3042) having distal lumen (14G) with a flow rate of 95 mL/min and proximal lumen (18G) with a flow rate of 38 mL/min was selected (Fig. 1A). The site was surgically prepared for sterile cannulation.

The animal was restrained in lateral recumbency and the incision area was sterilized thoroughly followed by local block with 2% lignocaine hydrochloride (Fig. 1B). In the ensuing step, the jugular vein was engorged by pressing jugular furrow (Fig. 1C) and a small incision of 0.5 cm was given on the skin over jugular vein with BP blade number 22 (Fig. 1D) and a Y-type introducer needle was introduced (18 G x 70 mm) at 45° angle (Fig. 1E). When flush of venous blood was obtained, the 'J' Tip guide wire was introduced in to the jugular vein and introducer needle was removed while leaving guide wire in place. A small superficial incision was made at the entry point of the guided wire to facilitate the passage of the dilator followed by insertion of the dilator using rotating motion to avoid bending and kinking of the wire. In the next step, suturing of the incision line was done with nylon 3-0 in simple interrupted manner and finally sterile dressing was done. While collecting blood post-catheterization, (Fig. 1F-1G) the dilator was removed and the catheter was advanced (Fig. 1H) to hold the end of the guided wire and blood was collected after removing the guided wire. In the culmination process, the lumen was flushed all the way and re-clamped after applying lumen caps. The CVC was stabilized properly for future blood collection

(Fig 2A-2B). While applying CVC, few check points must be taken care of to prevent further complications like the right atrium should be avoided while securing the tip of CVC due to its thin-walled nature and sufficient attention must be given while catheterization (CVC) in young animals as the guidewires may lead to cardiac ectopy. In addition to that, proper grasping of guidewire and identifying arterial blood during CVC in hypotension cases is critical to CVC application.

A central venous catheter is a thin, elastic cylindrical tube used for administration of strictly intravenous fluid and it has become a routine protocol for critically unfriendly patients. One of the distinguishing features of CVC is the multi-lumen nature, which helps to administer numerous fluids. As far as large animals like bovines and equines are concerned, external jugular and auricular veins are the most common site for placement of CVC.

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Author's contributions: SKR, DJ, VK: Performed catheterization process; RMM: Post catheterization care; KS: Preparation of the outline of manuscript.

Data availability statement: The data is available with the corresponding author and will be provided upon request.

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