Use of the Right External Jugular Vein as the Preferred Access Site When the Right Internal Jugular Vein Is Not Usable

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PURPOSE: The present study describes the authors' experience with central venous access through the right external jugular vein (EJV) when the right internal jugular vein (IJV) is not available.

MATERIALS AND METHODS: A retrospective study of 23 patients in whom a central venous catheter placement was attempted via the right EJV was conducted. The reasons for catheterization via the right EJV included clinically silent occlusion of the right IJV (n = 17), localized skin infection overlying the right IJV related to a previous catheterization (n = 3), presence of an existing Hickman catheter in the right IJV (n = 1), and concern regarding the risk of catheter-related infection secondary to right IJV catheterization in patients with a tracheostomy tube device adjacent to the presumed site of right IJV catheterization (n = 2). Technical success, procedural complications, and follow-up results including catheter dwell time and delayed or late complications (eg, symptomatic venous thrombosis, catheter-related infection, and catheter malfunction) were assessed. Adverse events were expressed as events per 100 catheter-days of use.

RESULTS: Technical success was achieved in 22 of 23 patients (96%). There were no procedural complications. The catheter dwell time ranged from 2 to 182 days, with a mean dwell time of 62.7 days. There were four delayed or late complications (three catheter-related infections, 0.22 per 100 catheter-days; one catheter malfunction, 0.07 per 100 catheter-days). No cases of symptomatic venous thrombosis were noted.

CONCLUSION: The right EJV is an acceptable and preferred access site when the right IJV is not available for central venous catheterization.

J Vasc Interv Radiol 2006; 17:823–829

Abbreviations: EJV = external jugular vein, IJV = internal jugular vein, IVC = inferior vena cava, SCV = subclavian vein, SVC = superior vena cava

THE indications for use of central venous catheters have expanded to include total parental nutrition, chemotherapy, long-term antibiotic treatment, hemodialysis, hemodynamic monitoring, medication administration, and body-fluid shunting (1). Central venous access therefore plays an increasingly important role in the delivery of modern medical care. Accordingly, many studies of the venous access sites through which central venous catheters can be placed have been conduced (2–9). The preferred access site for central venous catheter placement continues to be the right internal jugular vein (IJV).

However, when the right IJV is not available for central venous access, the second access site of choice is still unclear. With their larger diameters, the left IJV and the subclavian veins (SCVs) have been used as the preferred access sites by many surgeons and interventional radiologists. Nonetheless, several studies suggest that both SCVs should be avoided until both jugular veins have been eliminated (3,6–8) because of the higher risks of procedural complications such as pneumothorax and the higher incidences of central venous stenosis and thrombosis. Similarly, catheterization of the left IJV places the left brachiocephalic vein at risk for stenosis or thrombosis because catheter placement via the left IJV requires the negotiation of acute angles at the IJV and left brachiocephalic convergence and the left brachiocephalic vein and superior vena cava (SVC) convergence (5,10). In addition, the left IJV has been shown to yield the highest incidence of catheter malfunction (10). Forauer et al (11) have suggested that the ex-

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None of authors have identified a conflict of interest.

DOI: 10.1097/01.RVI.0000218048.28960.9E

ternal jugular vein (EJV) be considered for central venous access in patients with thrombosis of the IJVs. Because the anatomic course and length of the right EJV is very similar to that of the right IJV, the right EJV can be a good candidate for the second choice. Trerotola (5) has suggested that, if the right EJV is shown to be patent, the right EJV can be used as the second venous access site in expectation of similar results to those with the right IJV in patients receiving hemodialysis whose left arm must be preserved, without description of the detailed data.

The purpose of this study was to present and summarize our experience with central venous access with use of the right EJV as the second access site of choice when the right IJV cannot be used.

MATERIALS AND METHODS

A retrospective review was conducted of interventional radiology and medical reports for all patients at our institution in whom the right EJV was cannulated as the second venous access site. Institutional review board approval was obtained to enable the required retrospective review of the patients' records, but informed patient consent was not required for this retrospective analysis. The first venous access site for central venous catheter placement is the right IJV, which is the customary practice in our institution. All patients referred to us for central venous access or interventional procedures through the right IJV underwent clinical and ultrasound (US) examination of the right side of the neck. A portable 5-MHz linear transducer system (SonoSite, Bothell, WA) was used to determine the patency of the right IJV. If there were obstacles to placement of a catheter through the right IJV, such as IJV occlusion or skin infection overlying the right IJV, the right EJV was considered as a second venous access site at the discretion of the interventional radiologist who was to perform the procedure. The right EJV was selected only after assessment of vessel patency by US.

In the 35 months from October 2002 through August 2005, cannulation of the right EJV was attempted in 25 consecutive patients for insertion of 23 central venous catheters and two inferior vena cava (IVC) filters. In all cases, attempted cannulation of the right EJV was listed separately in our interventional radiology database to avoid an omission or selection bias. The two cases of IVC filter placement were excluded from this study to maintain study group homogeneity, even though IVC filter placement through the right EJV was successfully performed in the two patients. The 23 patients consisted of 14 women and nine men, ranging in age from 26 to 78 years (mean, 59.3 y; median, 67 y). Twenty patients had a history of central venous catheter insertion through the right IJV, both IJVs, or the SCVs, ranging from one to seven catheterizations with a mean of two catheterizations. The underlying diseases requiring central venous catheter placement were end-stage renal disease in 13 cases, non-Hodgkin's lymphoma in four cases, and one case each of acute renal failure caused by septic shock, tumor lysis syndrome developed during chemotherapy for T-cell lymphoma, chronic active Epstein-Barr virus infection, multiple myeloma, chronic myelomonocytic leukemia, and short bowel syndrome after multiple bowel resections for Crohn disease. The reasons for the catheterization of the right EJV included clinically silent occlusion of the right IJV (n = 17), localized infection at the skin overlying the right IJV related to a previous catheterization (n = 3), existence of a Hickman catheter inserted through the right IJV (n = 1), and concern about the risk of catheter-related infection secondary to right IJV catheterization in patients who had a tracheostomy tube device adjacent to the presumed site of the right IJV catheterization (n = 2). The 22 catheters successfully inserted were 12 nontunneled catheters for temporary hemodialysis, three tunneled catheters for permanent hemodialysis, six tunneled catheters for chemotherapy (four double-lumen catheters and two triple-lumen catheters), and one tunneled double-lumen catheter for total parental nutrition.

Before performance of the operative procedure, written informed consent for the procedure was obtained from each patient or responsible family member. The right side of the neck and upper chest of the patient were prepared according to our hospital's standard sterile technique. The right EJV was identified by visual inspection and palpation, and patency was confirmed by US in all patients. Puncture of the right EJV was made with use of a micropuncture needle (Cook, Bloomington, IN) under real-time US guidance. If possible, the Valsalva maneuver was applied to facilitate puncture of the vessel. After successful puncture, the 0.018-inch guide wire from the micropuncture set was introduced, and a 5-F dilator set was placed over the wire. Venography was performed to determine the course of the vessel and the patency of the central veins with manual injection of contrast medium (Xenetix 300; Guerbet, Roissy, France) via the 5-F dilator. When the central veins, including the right brachiocephalic vein and SVC, were occluded, a guide wire traversal test was attempted with a 0.035-inch hydrophilic guide wire (Terumo, Tokyo, Japan). If the wire passed the occluded segment, we performed the next step of the catheterization.

The following steps of right EJV catheterization were almost equivalent to those of the right IJV catheterization described in previous studies (3,4,12). If a tunneled catheter was to be placed, a subcutaneous tunnel was created inferiorly and laterally with use of blunt dissection techniques. The tunneled Hickman catheter (12-F double-lumen catheter; Cook; 12.5-F Hickman triple-lumen catheter; Bard Access Systems, Salt Lake City, UT) was trimmed to the desired length with use of the 0.018-inch wire as a guide (3). The tunneled hemodialysis catheters (12.5-F Soft-Cell precurved chronic dual-lumen catheter; Bard Access Systems) with lengths of 17 cm or 19 cm from the Dacron cuff to the catheter tip were used on the basis of measurement of the length from the puncture site to the atriocaval junction under fluoroscopic guidance. The 0.018-inch wire was then exchanged with a 0.035-inch wire, the venotomy site was dilated, and the appropriate peel-away sheath from the catheter kit was placed into the SVC over the 0.035-inch wire. The catheter was passed through the peel-away sheath as quickly as possible to avoid air emboli. Air emboli were minimized by pinching the peel-away sheath and/or instructing the patient to hum to increase the intrathoracic pressure. For