



Fenestration and Phlebectasia of the Internal Jugular Vein

Fatogoma Issa Koné^{1*}, Naouma Cissé¹, Djibril Samaké², Diarra et N'faly Konaté¹, Yaya Dembélé¹, N'faly Konaté¹, Neuilly Tafo³, Samba Karim Timbo¹ and Mohamed Amadou Kéïta¹

¹Department of ENT-Head and Neck Surgery, University Hospital of Gabriel Toure, Mali

²Department of ENT-Head and Neck Surgery, Reference Health Center Town V, Mali

³Department of ENT-Head and Neck Surgery, Reference Health Center Town I, Mali

Abstract

Objectives: We report a case of fenestration and phlebectasia of the right jugular vein with the spinal nerve passing between the branches of the fenestration. Through this case we discussed the surgical implications and review the literature.

Case Report: From 2013 to 2017, we conducted 1720 cervicotomies. On 1720 cervicotomies we only found one case of fenestration and phlebectasia of the internal jugular vein that makes a rate of 0.058%. Cervicotomy was conducted as part of the management of neurofibroma. The outcome was good.

Conclusion: The knowledge of the anatomical variations of the internal jugular vein is imperative for any ENT surgeon especially in a context of deficient plateau that does not allow the most often to make the preoperative diagnosis.

Keywords: Fenestration; Phlebectasia; Internal jugular vein; Spinal nerve

Introduction

The internal jugular vein is the main vein of drainage of blood flow to the head and neck [1,2]. It constitutes an important anatomical benchmark in oncological surgery in the context of ganglion dissection [1]. In intensive care during the placement of the central venous catheter and in interventional radiology [3]. It is the site of numerous anatomical variations, notably duplication and fenestration [1,2,4]. The etiology of this fenestration remains obscure. Several hypotheses have been described occurring in the genesis of fenestration: neuronal; vascular, bone and muscle [2,5]. The mode of preoperative discovery is the most common [2]. However, angiography, magnetic resonance imaging and Doppler ultrasound allow for preoperative diagnosis [2,5-7]. Venous dilatation, its relationship with the spinal nerve and omohyoid muscle is a risk of bleeding during central catheterization and cervical surgery [1,2,4-6,8,9].

We reported a case of fenestration and phlebectasia of the right internal jugular vein, in relation to the spinal nerve which crossed the fenestration. Through this case we discuss the clinical implications and review the literature.

Case Presentation

From 2013 to 2018, we conducted 1720 cervicotomies. On 1720 cervicotomies we found a case of fenestration and phlebectasia of the internal jugular vein that makes a rate of 0.058%. Our clinical case concerned a 15-years-old patient who had undergone a cervicotomy for right lateral cervical mass that had been evolving for six months. The cervico-thoracic computed tomography showed a heterogeneous mass sitting at the lateral cervical level, compressive without invading neighboring structures. An exploratory cervicotomy with excision of the mass was made. After locating homohyoid muscle and internal jugular vein. We performed a dissection from the bottom up. We found phlebectasia of the internal jugular vein measuring approximately 2 cm × 1 cm (Figure 1). The dissection conducted along the vein revealed a splitting in the form of a window (fenestration) through which the spinal nerve passed between the branches. No operative accident was noted. Histological examination of the operative specimen found a neurofibroma.

Discussion

The fenestration of the internal jugular vein is an entity. Kevin J et al. reported their incidence of 0.3% to 3.3% [2]. The frequency of 0.058% concerned all patients who had undergone

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*Correspondence:

Kone Fatogoma Issa, Department of ENT-Head and Neck Surgery, University Hospital of Gabriel Toure, Bamako, Mali, Tel: 0022365528056;

Fax: 20226090;

E-mail: konefatogomaissa@yahoo.fr

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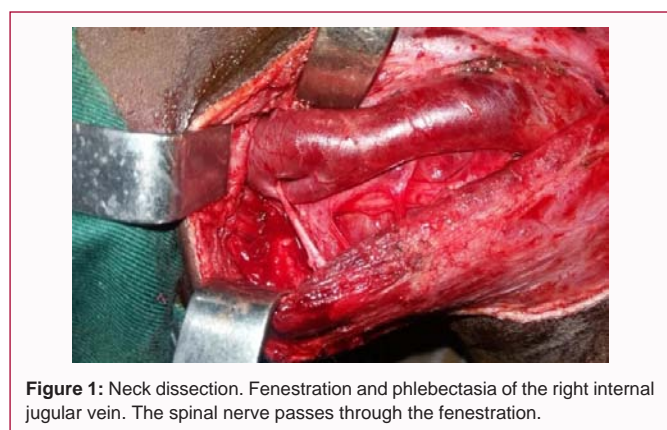
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Table 1: Review on fenestration of the internal jugular vein.

Authors	Year of publication	Number of Cases	Circumstances of discovery	The spinal nerve passes through the fenestration	Association with Phlebectasia
Park Ju Young [7]	2011	1 Case	CT scan	No	No
Atalar MH [11]	2012	1 Case	CT scan	No	No
Yuriko Hashimoto [4]	2012	4 Cases	CT Scan	Yes	No
Pegot A [14]	2014	1 Case	Intraoperative	No	No
Moreno-Sanchez M [5]	2015	1 Case	CT scan	No	Yes
Contrera KJ [2]	2016	3 Cases	Intraoperative	Yes 1 Case/3 Cases	No
Cvetko E [3]	2017	1 Case	Intraoperative cadaver	No	Yes
Our Case Report	2018	1 Case	Intraoperative	Yes	Yes



cervicotomy in our department and not the malformations related to the internal jugular vein. The different cases have been reported: complete duplication with two parallel internal jugular veins coming out separately from the jugular foramen and opening each into the infraclavicular vein, incomplete duplication also called " Y " fenestration with two separated branches coming from of the jugular foramen meeting in a single lower trunk or in "Y" inverse with a division of the internal jugular vein into two branches in its path and opening each in the infraclavicular vein, or in the form of a loop complete at one level of the vein pathway [3,8]. The etiology of fenestration of the internal jugular vein is unknown. Four etiopathogenic hypotheses have been mentioned [2,4,8,10].

1. A neural hypothesis suggests that the branching of the internal jugular vein results from an obstruction of growth by the accessory nerve of the spine during development. In our case, this hypothesis can be retained because the spinal nerve passes through the fenestration.
2. A vascular hypothesis suggests vascular weakness associated with turbulent flow could result in endothelial reorganization into separate vessels during development.
3. A bone hypothesis suggests that the junction is due to a developmental conflict of the internal jugular vein at the level of the jugular foramen [2-4,9].
4. A muscular hypothesis, based on an observed duplication of the internal jugular vein around the lower abdomen of the homo-hyoid.

During the fetal life, the accessory nerve passes between two veins: the lateral and medial veins of the head. The lateral vein, superficial to the accessory nerve, usually disappears, leaving the

superficial nerve to the vein. According to the review fenestration develops during early embryonic development between three and six weeks of gestation [11]. Another explanation is that duplication results from the appearance of a secondary venous ring at a lower level surrounding the accessory nerve of the spine. The persistence of this secondary ring in adult life may explain its occurrence [11]. In our case, this hypothesis can be accepted because the spinal nerve passes through the fenestration.

The circumstance of fenestration discovery is most frequently preoperative according to the literature review [1,2,4,6]. This discovery can be done preoperatively by CT angiography, MRI and Doppler ultrasound [2,6,7,12]. The discovery was fortuitous preoperatively in our patient. This intraoperative finding may be explained by the radiologist's lesser experience and inattention to the anatomical variation of the internal jugular vein in the search for tumor lesions, its structural changes in the neck by the small diameter of the fenestration and by impairment of the technical plateau [2]. The accessory branch of the spinal nerve and/or the lower abdomen of the homo-hyoid muscle can pass through or through the windows [3,5,6,8,10] (Table 1). Lee et al. [13] reported 5 cases of fenestration of the internal jugular vein traversed by the spinal nerve on 181 cervical dissections (2.8%). Contrera KJ reported one in three cases of spinal nerves passing through the fenestration [2]. Hashimoto Y reported 4 cases of fenestration through which passed the spinal nerve [4]. Our patient presented a fenestration through which the spinal nerve passed, to this fenestration associated phlebectasia. The etiology of phlebectasia remains obscure. Cvetko E and Moreno-Sanchez M reported concomitant cases of fenestration or phlebectasia [3,5] (Table 1).

The internal jugular vein is a major anatomical marker in cervical surgery and in venous catheterization [8]. The presence of anatomical variations on this vein exposes the surgeon to operational difficulties with the risk of hemorrhagic vascular lesion and nerve injury [8]. It is an essential radiological reference [14]. A diagnostic error can be misinterpreted as thrombosis or lymphadenopathy [14]. In our case, the dissection of the internal jugular vein was carried out from the homohyoid muscle, and it was possible to perform a dissection from the bottom up, with corollary the discovery of the fenestration. The careful dissection of the fenestration made it possible to locate the spinal nerve which passed through this fenestration. Dissection of the spinal nerve was made retrograde. The fortuitous discovery of the fenestration associated with phlebectasia in our patient constituted our surgical difficulty in terms of dissection. The presence of the spinal nerve through the fenestration made him vulnerable. The knowledge of this anatomic variation made it possible to avoid the operative incident by conducting a careful dissection.

Conclusion

The preoperative discovery allows the surgeon as well as the radiologist to prevent vascular and nervous accidents related to surgical practice and central venous catheterization on the neck. Preoperative finding is a risk for the nerve and vein especially in cases of phlebectasia. The knowledge of the anatomical variations of the internal jugular vein is imperative for any ENT surgeon especially in a context of deficient plateau that does not allow the most often to make the preoperative diagnosis.

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