
Partial aneurysmectomy and autologous patch venoplasty of the jugular vein in a horse

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Introduction

Experience with vascular surgery is limited in horses and autologous vein grafts have only been used for treatment of thrombophlebitis. In human surgery several venoplasty techniques are commonly used. The aim was to describe treatment of a jugular vein pseudo-aneurysm using an autologous saphenous vein patch technique to create an isodiametric lumen and minimize thrombus formation.

Materials and Methods

Case report of a 3-year-old female pony presented with an intermittent local swelling of the left jugular vein following previous thrombophlebitis and resultant exercise intolerance. Ultrasonographic examination revealed a large pseudo-aneurysm. Treatment consisted of a partial aneurysmectomy preserving part of the vein wall. The saphenous vein was harvested and was cut longitudinally to increase the surface of the patch, which was then sutured to the remaining jugular vein wall. Anticoagulants, antimicrobial and anti-inflammatory drugs were administered post-operatively. Follow-up ultrasound examination showed narrowing (0.7cm) of the caudal part of the graft.

Results

At 2 and 8 months post-operatively, no external deformation of the jugular vein was visible. Ultrasonography revealed patent blood flow with limited lumen narrowing (1.5cm) and a homogeneous vein wall, except for some remaining sutures.

Discussion / conclusions

The patch venoplasty proved a viable surgical technique for jugular vein reconstruction resulting in an isodiametric lumen, no thrombus formation and a good cosmetic outcome. Additional research is needed to evaluate other venoplasty techniques for treating vascular pathology in horses.

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Introduction

Vascular surgery is an important field in human medicine due to the high prevalence of vascular pathology, organ transplantation and invasive tumor removal.¹ In horses vascular pathology is less common and lesions are either treated conservatively or vessels are being obliterated. Limited research has been done regarding vessel reconstruction in horses. Jugular vein (JV) replacement by autologous saphenous vein (SV) grafts has been performed but the small diameter is likely to lead to thrombus formation.^{2,3} In human surgery an isodiametric lumen in autologous grafts is achieved through different venoplasty techniques such as the use of spiral or patch grafts.

In this case report we describe a partial aneurysmectomy followed by JV reconstruction using an autologous SV patch technique.

Case description

A 3-year-old female pony was treated for thrombo-phlebitis and peri-phlebitis of the left JV with peri-venous abscess formation. Ten days after abscess drainage some blood was noticed during flushing, so this was discontinued. Follow up ultrasounds revealed secondary recanalization, regular vein walls and re-organization of the sub-cutaneous tissues. The drainage site healed by secondary intention and the mare was discharged four weeks after admission.

Two weeks after discharge the mare presented an intermittent localized swelling of the left JV during light exercise and when lowering the head. The swelling increased progressively over the next few weeks and the mare had signs of exercise intolerance. She was presented to the clinic again 2 months after the initial discharge. On physical examination the mare showed a 2 centimeter cutaneous depression on the cranial third of the left JV. When the vein was compressed caudally or the horse lowered the head, a local distention of about 12cm long, 8cm wide and 3cm thick gradually appeared (Fig 1). Ultrasonography revealed a localized lateral wall defect resulting in a marked external swelling when the vein was occluded caudally. The lesion was classified as an iatrogenic pseudo-aneurysm of the left JV.

It was decided to perform a partial aneurysmectomy and JV reconstruction. General anesthesia was induced and heparin (100IU/kg) was administered IV.^{2,3} The right SV and its side branches were marked on the skin after ultrasonographic localisation. The left jugular region and the medial side of the right hind leg were surgically prepared. Two surgical teams worked simultaneously. The first team dissected the JV at the level of the aneurysm. The skin covering the aneurysm was partially removed at the site where it could not be separated without risk of disruption of the aneurysm. A cranial and caudal vein clamp were applied to facilitate dissection and isolation of the distended vein (Fig 2). Subsequently, the affected lateral vein wall, which was much thinner than the normal wall, was removed. The remaining healthy vein wall (ca. 1/3 of total vein circumference over a length of ca. 15cm) was temporarily sutured to moist abdominal swabs to avoid contraction and aid in suturing the patch to the remaining vein wall. The second surgical team dissected the right SV. A segment of ca. 20cm was harvested after proximal and distal ligation and ligation of a few side branches. The vein was placed into a heparin solution (250IU heparin in 100ml 0.9% saline)² and was cut longitudinally with right angled scissors.¹ The large branches located at the distal aspect of the SV were also cut longitudinally to increase the total surface of the patch even more. The direction of the patch was reversed to oppose the originally distal part of the SV to the cranial part of the JV. The patch was then sutured to the JV with a combination of simple interrupted and simple continuous polypropylene sutures (USP5/0), taking care to obtain slight tissue eversion and to avoid tension on the vein wall.^{2,3} When the patch was almost completely sutured to the vein the cranial clamp was removed to fill the newly created lumen and remove

the air. The last sutures were placed and the remaining vein clamp was removed (Fig 3). Some profuse bleeding was visible at the site of reconstruction which was managed by temporary local compression. The skin wound was closed in three layers with polyglactin 910 USP0. A stent was applied on the JV wound and the right hind limb was bandaged.

Post surgically the mare was given enoxaparine (0.35mg/kg btw SC SID) for 4 days and clopidogrel (2mg/kg btw per os SID) for 24 days. Clotting profiles were regularly checked. The mare also received antibiotics during 6 days and anti-inflammatory drugs during 4 days after surgery. A swelling around the JV incision site was present the first few days. The mare also presented fever (39,1°C), a cough and some nasal discharge the day after surgery. These symptoms regressed rapidly. The stent on the JV was changed every day for the first 7 days postoperatively. No swelling of the right hind limb appeared at any point in time. Hay was fed in a net at head height to decrease tension on the JV and prevent blood stasis.

Follow-up ultrasound of the reconstructed JV showed the constant presence of blood flow. Peri-venous blood clots were visible the first days after surgery and at the caudal aspect of the graft the JV diameter was only 2mm. Over the following days a well-defined hematoma was visible medial to the vein. The diameter of the vein after caudal occlusion was uneven with a narrowing at the caudal part of the graft: 0.4cm at 1 week and 0.7cm at 3 weeks post-surgery. Given the good evolution of the wounds and the improvement of the ultrasonographic appearance of the vein, the mare was discharged.

Result

At the first control 2 months post-operatively both wounds had completely healed, no external deformity of the vein was visible. Ultrasonographic evaluation revealed a homogeneous vein wall except for sutures that remained visible. The smallest diameter of the distended vein was 1.22cm. At the second control 8 months postoperatively the owner stated that the mare had resumed work successfully without signs of exercise intolerance. The vein distended equally over its full length when compressing it caudally. Ultrasonographic evaluation revealed a homogenous vein wall while intra-mural sutures remained visible. The smallest diameter of the JV at the caudal part of the graft was 1.5cm, compared to 1.8cm contra-laterally.

Discussion

In literature only one case of venous aneurysm in the horse is described, yet without successful surgical correction.⁴ In human medicine multiple graft techniques have been described.^{1,5} The patch venoplasty technique was chosen in this case because of the partially normal medial vein wall.¹ The lumen that was created was more isodiametric, the flow within the vein less turbulent and no thrombus formation was seen. Another possibility is the use of a spiral autologous graft.⁵ This would however have increased surgery time, would have required the resection of the remaining healthy vein wall and most likely, the total length of the harvested SV would not have been long enough. An allogeneous graft is a third possibility.³ In an experimental study in ponies, polytetrafluoroethylene grafts remained patent during the trial but the presence of a neo-intima could not be confirmed.³ In human patients a gradual decrease in allogeneous graft diameter can be seen due to fibrosis. In conclusion, partial aneurysmectomy combined with patch venoplasty proves a viable surgical technique for treatment of a venous pseudo-aneurysm in horses. Additional research is needed to evaluate other venoplasty techniques and their possible use in treating vascular pathology in the horse.

References

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Fig 1: pseudo-aneurysm of the left JV



Fig 2: Dissection of the pseudo-aneurysm of the left SV.



Fig 3: Remaining healthy vein wall after partial aneurysmectomy (left) and result of patch venoplasty (right).