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Abstract

Introduction: Endovascular techniques (ET) have emerged in recent years as alternative treatments for traumatic vascular lesions especially in areas of difficult access such as the thoracic outlet (TO). **Methods:** A retrospective review of patients with arterial trauma of the TO treated at a Level I Trauma Center from 2008 to 2012 was conducted. Clinical presentation, treatment, and results are shown. **Results:** Twenty-three patients were treated; 22 were men. The median age was 37 (IQR 23-46). Injuries were caused by firearms in 18 patients, sharp objects in three, blunt trauma in one, and iatrogenic causes in one. Median ISS and RTS were 20 (IQR 16-29) and 7.55 (IQR 6.38-7.84), respectively. Twenty-five arterial segments were compromised, most frequently the subclavian in 13 (52.0%) and the axillary in eight (32.0%). Treatment was open in 14 patients (OPEN group), initially endovascular in seven (ENDO group), and initially open with endovascular treatment of complications (ENDOc group) in two. Ten patients in the OPEN group, three in the ENDO group, and two in the ENDOc group had hypotension or active bleeding at arrival. In the ENDO group, seven patients received definitive management with primary endovascular stenting, two of them with embolization. One received endovascular proximal control with an angioplasty balloon and was subsequently repaired open. The ENDOc group patients had been repaired by open surgery, developed postoperative ischemia, and were rescued by endovascular thrombectomy and stenting. Serious complications occurred in four patients in the OPEN group: death due to exsanguination in one case, cerebral infarction with subsequent death in one case, infection of the repair with exsanguinating bleeding in one case, and extensive ischemic damage of the extremity treated with amputation in one case. No major complications occurred in the ENDO and ENDOc groups; their repairs were found permeable at follow-up. **Conclusion:** Endovascular treatment was used in the spectrum of complex TO arterial injuries in 43% cases, from vascular control before open repair in a hypotensive patient, to the definitive and complete treatment of injuries in stable patients and the rescue of occluded open repairs. ET options continue to increase for vascular injuries in this complex topography.

Introduction

Anatomically, the subclavian artery and the axillary artery are located in a transition zone between the junction of the neck, thorax and upper limbs. The surgical approach to these structures represents a great challenge, with increased rates of morbidity and mortality. In recent years, endovascular techniques have emerged as an alternative in the treatment of traumatic vascular lesions for this anatomic location. We could obtain a maximum benefit from the use of these attractive therapeutic alternatives. The aim of this study was to describe the outcomes of patients who sustained arterial vascular trauma of the thoracic outlet, and were treated with open surgery or with endovascular techniques.

Methods

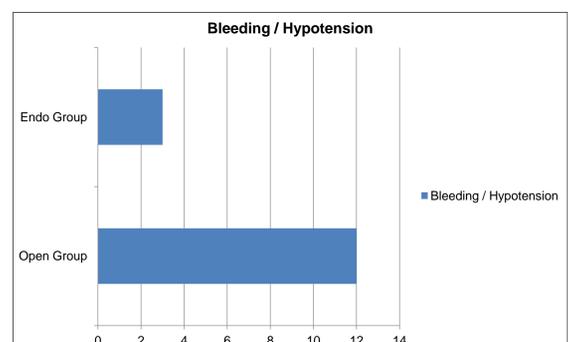
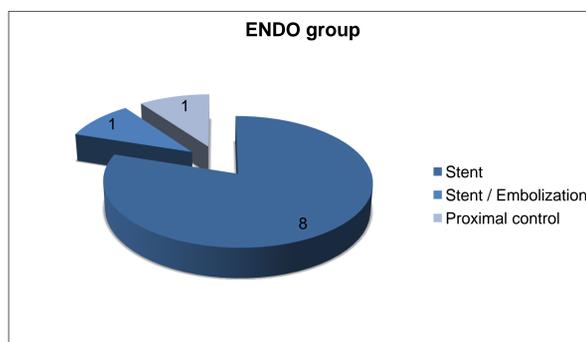
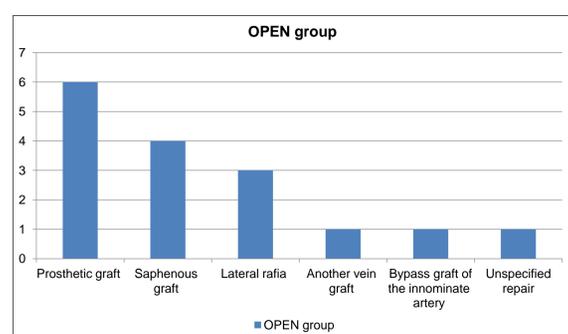
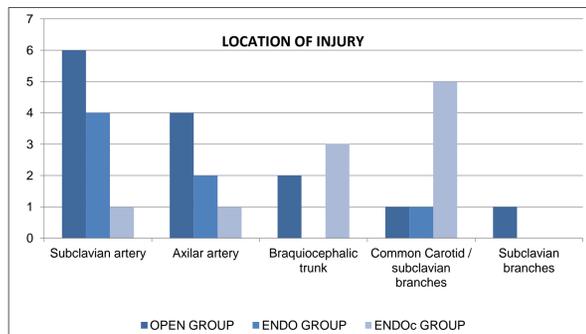
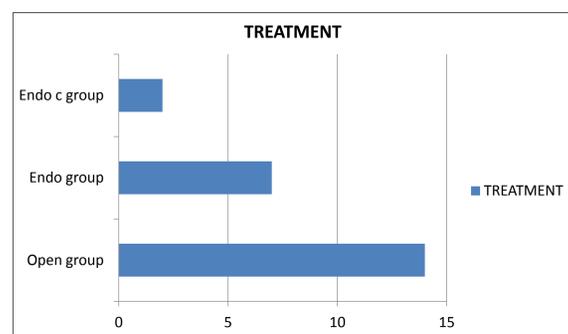
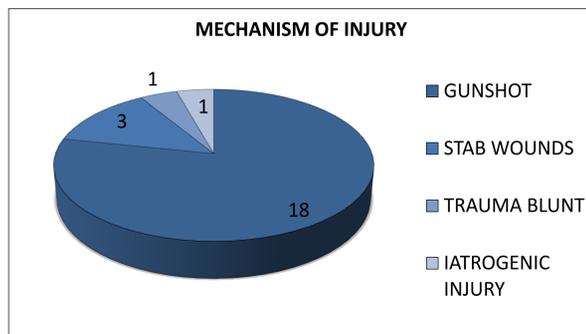
We performed a retrospective review of clinical records of 23 adult patients admitted to the Fundación Valle del Lili, a level I trauma center in Cali – Colombia, with arterial vascular trauma of the thoracic outlet during 2008-2012. We collected patient's demographics, clinical information, injury information (mechanism, severity (RTS, ISS), location); and type of treatment (open treatment vs endovascular treatment). Outcomes of interest were complications after treatment, patency of the vascular repair, and mortality. Results are presented separately by type of intervention. Statistical analyses are presented as median and inter-quartile for continuous variables and as frequency and percentages for categorical variables.

Results

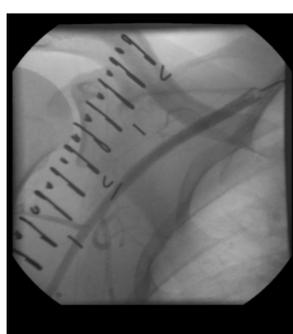
The mechanism of injury was gunshot in 18 patients, stab wounds in three patients, and blunt trauma in one patient; there was an iatrogenic injury documented in one patient. Fourteen patients were managed with open technique, seven with endovascular technique, and two patients with combined techniques.

In patients managed with open technique, a prosthetic graft was performed in six patients, a saphenous graft in four, another vein graft in one patient, and a bypass graft of the innominate artery was performed in one patient. There were three patients in which lateral resection was performed.

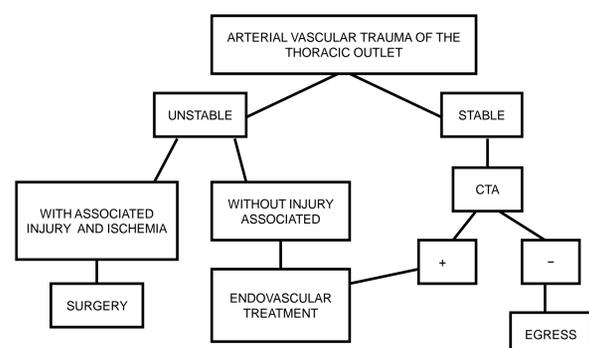
In patients managed with endovascular technique, eight were managed with stent, a stent and embolization was performed in one patient, and a cobra balloon for proximal control was placed in one patient prior surgery (open repair).



Subclavian artery pseudoaneurysm



Endovascular repair with stent



Conclusion

Endovascular treatment was used in the spectrum of complex Thoracic outlet arterial injuries in 43% cases, from vascular control before open repair in a hypotensive patient, to the definitive and complete treatment of injuries in stable patients and the rescue of occluded open repairs.

This technique is an emerging option in the treatment of vascular lesions of this complex anatomy and may offer benefits to patients compared with open surgery, should be performed in centers with adequate infrastructure and availability of personnel trained in this technique.