



## Guest editorial

## Vascular injury and orthopaedics

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The anatomical vicinity of bone to neurovascular structures may be the culprit for the relatively high incidence of neurovascular injuries that orthopaedic surgeons observe. Neurovascular injuries can have dire consequences for the patient, often resulting in serious functional limitations. Vascular injuries in particular are troublesome. Although majority of these injuries occur as a result of trauma leading to fracture or dislocation of joints, such as the case reported by Addeveico et al. [1] in this issue of *Arthroplasty Today*, injuries to vascular structures can also occur during elective orthopaedic procedures.

An unpleasant aspect of vascular injury in orthopaedics is the medicolegal issues that can follow. In a prior study from our institution, we were surprised to discover that a relatively large number of patients with vascular injury after an elective arthroplasty had resorted to filing suit against the treating surgeon [2]. In our litigious society, there are an abundance of lawyers who are prepared to file suits for any complications after orthopaedic procedures, but the vascular injury seems to be a favorite one. I am not certain as to why patients find vascular injuries as an unacceptable complication of orthopaedic procedures. Many of us may not have much sympathy for a surgeon causing direct injury to a vascular structure during an uncomplicated orthopaedic case. However, the

literature demonstrates that majority of vascular injuries are caused by indirect trauma [3,4]. Traction to the joint and placement of instruments for exposure, as is needed for completion of surgical procedure, are more common causes of vascular injuries. The presence of anatomical aberrations, adhesions from prior surgeries or recurrent hematoma formation (as is the case in hemophilic patients), severe deformities that alter the anatomy of the adjacent neurovascular structures are also some reasons why vascular injuries may occur. Direct injury to vessels such as perforation caused by a sharp instrument such a drill, saw, or knife is rare, perhaps the exception being the direct damage to the vessels that can occur during acetabular screw placement in total hip arthroplasty [5,6].

Regardless of the mechanism of injury, an indisputable fact is that early recognition of vascular injury is critical to prevent irreversible damage to tissues. Thus, every institution needs to have protocols in place that mandates neurovascular check at regular intervals after orthopaedic procedures. However, a multitude of issues may come to play that can lead to a delay in identification of a vascular injury. The use of a tourniquet may conceal profound bleeding that can occur with direct injuries. The intrapelvic location of the vessels that are injured during acetabular screw placement may allow these injuries to go unnoticed for a while. Indirect injuries to a vessel such as intimal damage may not manifest itself for a period of time and may be missed during the early postoperative period. In our published series of vascular injuries after total joint arthroplasty, there were a few patients who manifested vascular insufficiency many days after arthroplasty [7]. Thus, timely recognition of vascular injury may not always be possible. The case report by Addeveico et al. again highlights the delay in presentation of vascular injury that may be seen occasionally with traumatic injuries also. Patients with delay in diagnosis or delayed presentation may manifest with swollen extremity and near necrotic soft tissues. These patients may require fasciotomy and multiple surgical procedures that may place them at risk of infection of a prosthetic joint [8].

One issue that remains unresolved is the preoperative identification of patients at higher risk of vascular injury. There is certainly a group of patients with pre-existing vascular disease such as atheroma or calcification in the vessel wall who may be at a higher risk to suffer vascular injury, even with minimal traction of the vessels during surgery. There is no conclusive evidence that preoperative evaluation of these patients by vascular experts can reduce the incidence of vascular injuries. It is, however, important

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to perform vascular check of all patients preoperatively and identify patients with vascular insufficiencies. The latter group of patients certainly would benefit from vascular consult. Those with prior vascular reconstruction, such as those with grafts, should all be sent for evaluation by a vascular team before surgery, and specific strategies during surgery such as gentle traction on the vessel or avoiding the use of tourniquet need to be implemented. It is also logical to assume that patients with prior vascular issues or those with undergoing complex orthopaedic procedures that can place the vascular structures at risk of injury should only be performed in institutions or hospitals where vascular surgery service is available in case of intraoperative problems [9].

Despite all attempts and implementation of specific strategies, our patients need to understand that vascular injuries can and do occur during orthopaedic procedures.

## References

- 1 Addevero F, Nucci AM, Rosati M, Poggetti A, Scaglione M. Traumatic anterior dislocation of a prosthetic knee, from trauma to a delayed onset of vascular injury: a case report and proposal of algorithm management. *Arthroplasty Today* 2018;4(4):407.
- [2] Parvizi J, Pulido L, Purtill JJ, Sharkey PF, Hozack WJ, Rothman RH. Vascular injury following total joint arthroplasty. *J Arthroplasty* 2008;23(5):643.
- [3] Karanam LSP, Busireddy NR, Baddam SR, Makineni K, Paidimukkala V, Raghavasarma P. Acute thrombotic occlusion after total knee arthroplasty: role of endovascular management. *J Clin Orthop Trauma* 2018;9(2):121.
- [4] Shuai A, Huiliang S, Mingli F, Zheng L, Yining W, Guanglei C. Femoral artery injury during total hip arthroplasty. *Arthroplasty Today* 2018;4(4):459.
- [5] Tavares RLP, Arcenio Neto E, Taki W. Total hip revision arthroplasty of high-risk pelvic vascular injury associated with an endovascular approach: a case report. *Rev Bras Ortop* 2018;53(5):626.
- [6] Preston JS, Mennona S, Kayiaros S. Phlegmasia cerulea dolens and external iliac vein disruption after revision total hip arthroplasty. *Arthroplasty Today* 2018;4(4):401.
- [7] Padegimas EM, Levicoff EA, McGinley AD, Sharkey PF, Good RP. Vascular complications after total knee arthroplasty—a single institutional experience. *J Arthroplasty* 2016;31(7):1583.
- [8] Vegari DN, Rangavajjula AV, Diiorio TM, Parvizi J. Fasciotomy following total knee arthroplasty: beware of terrible outcome. *J Arthroplasty* 2014;29(2):355.
- [9] Asemota D, Passano B, Feng JE, Novikov D, Anoushiravani AA, Schwarzkopf R. Preoperative optimization for vascular involvement complicating revision total hip arthroplasty. *Arthroplasty Today* 2018;4(4):411.