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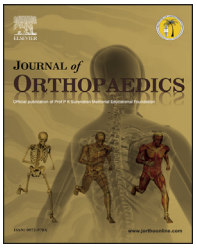

Original Article

Severe vascular complications and intervention following elective total hip and knee replacement: A 16-year retrospective analysis

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ABSTRACT

Introduction: Iatrogenic vascular injuries associated with elective orthopaedic joint procedures are relatively rare, however when they do occur they carry a risk of significant morbidity and mortality. The aim of this study was to investigate the incidence of vascular complications and resultant need for specialist intervention following elective total hip replacement (THR) and total knee replacement(TKR).
Methods: This was a retrospective analysis of prospectively collected data. The primary outcome measure was vascular complication requiring an interventional radiology procedures or vascular surgery. As a secondary outcome measure postoperative Modified Knee Society Scores and Harris Hip Scores were analysed to assess long term clinical outcome.
Results: Six cases of vascular injury requiring specialist intervention were identified. From 2073 total TKRs there were one cases of popliteal artery injury, one case of venous injury and two case of lateral geniculate artery injury (0.19%). From 1601 THRs there were two cases (0.12%) of arterial injury. All patients were treated successfully by a vascular surgeon or an interventional radiologist. Patient outcome varied considerably with the poorest results seen in the THR group.
Conclusions: Iatrogenic vascular complications following elective THR and TKR carry a risk of significant morbidity and mortality. It is important that surgeons and trainees performing these procedures are conscious of these risks and able to identify vascular injuries promptly when they occur. Detailed preoperative assessment, an awareness of anatomical variants and close liaison with a vascular surgeon may all help to reduce the number and severity of adverse outcomes.

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1. Introduction

Despite the anatomical proximity of the large veins and arteries to the surgical field during lower extremity arthroplasty, the incidence of vascular injuries during total knee and hip arthroplasty is low, ranging from 0.03% to 0.2 %.[1–4] Nevertheless the resultant morbidity and mortality associated with such injuries necessitates that surgeons and trainees are aware of both the risk of vascular insult and the variety of ways in which these injuries may manifest. Immediate and early signs of arterial injury following arthroplasty can vary from massive haemorrhage and shock to acute limb ischaemia. However some patients will present with more chronic features including persistent pain, swelling, or resistant anaemia secondary to pathologies including false aneurysm or arteriovenous fistula. Surgeons must be aware of these presentations in order to reduce diagnostic confusion and avoid the harmful outcomes associated with delayed diagnosis.

The mechanism of direct vascular injury following TKR can be classified into four general categories: arterial occlusion, arterial severance, arteriovenous fistula formation, and arterial aneurysm formation. The most common vessels injured during TKR are the popliteal artery and tibial artery. The incidence and distribution of venous injury is less well described in the literature.

2. Methods

This was a retrospective analysis of data collected prospectively from the Assaf Harofeh Medical Centre. Data were extracted from a local electronic database and cross-checked with clinical notes for verification and acquisition of supplementary information. 1601 THRs (326 revisions) and 2073 TKRs (223 revisions) performed consecutively between 1995 and 2011 were analysed (Table 1). All procedures were performed by, or under the supervision of, two lead arthroplasty consultants. The mean age of patients was 67 years and 58% of patients were male. Electronic and paper records were interrogated for the type of surgery performed, number of previous surgeries, and concurrent co-morbidities including atherosclerosis, diabetes, and hypertension. Specific attention was paid to any record of vascular complication, the clinical presentation of complications, the imaging modality utilised in the diagnosis of the vascular complication, subsequent intervention, and clinical outcome. In all cases of TKR, Thigh Tourniquet was used (300 mmHg) as part of the femeral and tibial components cementation. The primary outcome measure was vascular complication requiring treatment from an interventional radiologist or vascular surgeon. As a secondary outcome measure postoperative Modified Knee Society scores and Harris Hip Scores were analysed to assess any long term clinical outcome.[5,6] This was achieved by inviting all patients identified as suffering a significant vascular complication back for interview and clinical assessment. Isolated thromboembolic events were excluded from the study.

Table 1 – TKA and THA performed in our institution between the years 1995–2011.

Technique	Primary TKA	Revision TKA	Primary THA	Revision THA
Cemented	1829	223	426	
Cementless	24		849	326
Total	2073		1601	

TKA = total knee arthroplasty, THA = total hip arthroplasty.

3. Results

Data on 1601 THRs (326 revisions) and 2073 TKRs (223 revisions) were analysed. Six patients were identified as sustaining a substantial vascular injury that required the input of a vascular surgeon or interventional radiologist. In the TKR group there were Three cases of acute arterial injury (popliteal artery and two cases of lateral geniculate artery), one case of venous injury (branch of popliteal vein). In the THR group there were two cases of acute arterial injury (obturator artery and external iliac artery). All cases were treated successfully with the assistance of either a vascular surgeon or an interventional radiologist. All operated limbs were salvaged. At final follow up all patients were ambulating independently or with minimal assistance however there were considerable variations in functional outcome scores.

4. Patient 1

A 73-year-old female underwent an elective left TKR for osteoarthritis six months after an uneventful similar procedure on the opposite leg. Past medical history included hypertension and ischemic heart disease. Pre-operative radiographs illustrated calcified popliteal vessels however there were no clinical signs of vascular impairment at pre-operative assessment.

Immediately following tibial resection a massive pulsatile haemorrhage was encountered. After attempts to achieve anterior vascular control failed the vascular surgeons were called. The patient was turned into a prone position to facilitate a posterior approach. A 270° tear of the popliteal artery, probably caused by the saw blade, was identified and sutured by the vascular surgeon. The procedure was abandoned due to haemodynamic instability however definitive arthroplasty was resumed after six weeks with an uneventful course. At latest follow up (7 years post procedure) range of motion was 0–85° and the patient was ambulating without aids. The modified knee society knee and functional scores were 80 and 70, respectively. Radiographs demonstrated well aligned components with no signs of loosening.

5. Patient 2

A 73-year-old female underwent an elective right TKR for osteoarthritis six months after an uneventful similar procedure on the opposite leg. Five days after discharge from