

Home | Journals | Sponsors | Books and Links | PubMed | Contact Us



Advertisement

www.Google

Spondylosis Treatment
Advanced outpatient
procedures. No hospitalization.
Free info kit.
www.Bonati.com

Brachial plexus injury?
Private nerve surgeon London
Prof Carlstedt appts 020 7224
3830
www.LondonNerveCentre.co.uk

Hip & Knee Surgery in E.U
Full package includes all
surgery, flights, 14 day
aftercare from £4299
www.StcMedicalServices.net

Hip and Knee Replacement
Arthroscopy, total hip & knee
joint replacement, orthopaedic
procedures
www.orthops.co.uk

Tourniquets
Lots of types & colours
available Fast, efficient
service. Low P&P
www.genmedical.com

Web www.ispub.com

Google Search

AWARDS



Advertisement

My hip replacement?
Check the successrate of your hip
replacement!
www.outcomecalculator.org

Total knee replacement
Answers to your questions about
Arthroplasty & surgical treatments.
yourtotalhealth.village.com

Regain Lost Movement
New Therapy. Effective for stroke, MS or nerve
damage of any kind.
www.imf-therapy.co.uk

AnesthesiaNow.com
Free access to the latest scientific and clinical
literature.
www.AnesthesiaNow.com

www.Google

The Internet Journal of Orthopedic Surgery™ ISSN: 1531-2968

Home | Current Issue | Archives | Instructions for Authors |
Disclaimer | Printable Version

Femoral And Saphenous Nerve Palsy Post-Total Knee Replacement

D. Gomez, MB ChB, MRCS

Department of Orthopaedic Surgery
The Bradford Teaching Hospitals NHS Foundation Trust
Bradford United Kingdom

S. K. Sidhu, MB ChB, BOA

Department of Orthopaedic Surgery
The Bradford Teaching Hospitals NHS Foundation Trust
Bradford United Kingdom

K. Jha, FRCS

Department of Orthopaedic Surgery
The Bradford Teaching Hospitals NHS Foundation Trust
Bradford United Kingdom

Citation:

D. Gomez, S. K. Sidhu, K. Jha: Femoral And Saphenous
Nerve Palsy Post-Total Knee Replacement. *The Internet
Journal of Orthopedic Surgery*. 2006. Volume 3 Number 1.

Keywords: Femoral nerve, Saphenous nerve, Nerve palsy,
Tourniquet, Electromyography

Table of Contents

Abstract
Introduction
Case Report
Discussion
Conclusion
References

Abstract

Peripheral nerve injuries following surgery can have a significant impact on the rehabilitation process. We report a case of a 66-year old lady who was unable to straight leg raise and had altered sensation in the anterior thigh and medial leg compartment following a primary total knee replacement. Three weeks following surgery an electromyography and nerve conduction study was performed due to persistent symptoms and poor rehabilitation and this revealed femoral and saphenous nerve palsies. Our report is believed to be the first on femoral and saphenous nerve palsies following primary total knee replacement. We consider that tourniquet-induced nerve lesion can occur despite tourniquet time and pressure being in the acceptable safe range. Persistent poor rehabilitation following surgery using a tourniquet warrants further investigation to exclude peripheral nerve palsy.

Introduction

Peripheral nerve injuries due to orthopaedic surgery involving the knee is a recognised complication and this may affect the rehabilitation process. Paralysis of the sciatic nerve following knee ligament surgery,¹ peroneal nerve palsy following total knee arthroplasty² and tibial nerve palsy complicating anterior cruciate ligament reconstruction³ have been reported. Femoral nerve palsy is more commonly seen in hip surgery compared to knee surgery.⁴ We believe this is the first reported case of femoral and saphenous nerve palsy following primary total knee replacement with the use of a pneumatic tourniquet.

Case Report

Our patient was a 66-year old lady with a history of severe bilateral osteoarthritis of the knee with neurologically intact lower limbs pre-operatively. The patient underwent a left primary total knee replacement under spinal anaesthesia. The operation was performed in a bloodless field using a pneumatic tourniquet. The tourniquet was inflated to 300 mmHg from the onset and was maintained at that pressure until completion of the procedure at 75 minutes. No intra-operative complications were noted.

First day post-surgery, the patient was unable to straight leg

[Regain Lost Movement](#) →

New Therapy. Effective for stroke, MS or nerve damage of any kind.

www.inf-therapy.co.uk

[Total knee replacement](#)

Answers to your questions about Arthroplasty & surgical treatments.

yourtotalhealth.village.com

[AnesthesiaNow.com](#)

Free access to the latest scientific and clinical literature.

www.AnesthesiaNow.com

Ads by Google

raise but dorsi-flexion and plantar flexion was normal. This was attributed to post-operative pain and was treated with regular analgesia. One week post-surgery, the patient was still unable to straight leg raise and this had impaired her rehabilitation process. Clinical examination demonstrated no quadriceps contraction and altered sensation in the anterior thigh and medial leg compartment.

An ultrasound scan at seven days following surgery reported an intact quadriceps tendon but was unable to exclude a small rupture. A computer tomography (CT) examination performed at 10 days post-knee replacement suggested a possible partial rupture of the quadriceps tendon, superior to its insertion at the patella. However, wound exploration revealed an intact repair of the quadriceps mechanism. Magnetic resonance imaging scan of the lumbar spine at two weeks post-surgery was normal. Electromyography (EMG) and nerve conduction study at three weeks post-total knee replacement revealed severe femoral nerve palsy with Wallerian degeneration and marked denervation in the left quadriceps. There were no motor units recordable under voluntary control in the left quadriceps (refer to Table 1) and no response recorded in the left saphenous nerve (refer to Table 2). Patient was discharged with out-patient physiotherapy and knee splint. The patient stopped using the knee splint after six weeks.

Table 1: Electromyographic examination performed three weeks after tourniquet use for left total knee replacement.

<i>Muscle</i>	<i>Activity at rest</i>	<i>Interference pattern</i>
<i>Left vastus medialis</i>	Continuous fibrillations	No motor units
<i>Left vastus lateralis</i>	Continuous fibrillations	No motor units
<i>Left adductor magnus</i>	Silent	Within normal range

Table 2: Nerve conduction study performed three weeks post-surgery.

<i>Sensory nerves</i>	<i>Latency (msec)</i>	<i>Amplitude (microvolts)</i>	<i>Velocity (metres/sec)</i>
<i>Left sural</i>	2.1	11.0	47.6
<i>Left saphenous</i>	No response		
<i>Right saphenous</i>	1.8	1.8	50.0

Clinical examination at four months follow-up showed an

improvement in quadriceps power (4+/5) with extensor lag of 20 degrees. Sensory changes demonstrated previously showed a decreased area of paraesthesia. Range of movement of the knee joint was between 20 to 100 degrees and the patient was mobilising independently with one stick. EMG at four months revealed some improvement in femoral nerve function. Although motor units are readily recordable under voluntary control in vastus lateralis, this is not the case with vastus medialis. However, overall there has been some improvement. Due to the severity of nerve damage in this case, further improvement is likely to be slow.

Discussion

Femoral nerve palsy is a rare but recognised complication of knee surgery. Reported causes include fluid extravasation with an infusion pump irrigation system⁵ and tourniquet use^{3, 4, 6}.

Clinical diagnosis of peripheral nerve palsy following surgery can be difficult. Poor rehabilitation during the first week following surgery could be due to various reasons including post-operative pain, deep vein thrombosis, infected prosthesis, breakdown of tendon repair and patient's co-morbidities. In the absence of any obvious underlying pathology and persistent poor rehabilitation, peripheral nerve investigation should be considered. In our case, following the exclusion of a quadriceps tendon rupture with surgical exploration, an EMG was diagnostic for femoral and saphenous nerve palsies.

There have been case reports suggesting an association between peripheral nerve palsies and prolonged use of the pneumatic tourniquet. A recent report suggested the predominant cause of femoral nerve palsy was the prolonged use of the tourniquet; this being 280 minutes.⁴ Saunders *et al* showed that 85% of patients who underwent knee arthrotomy had nerve palsy by EMG in cases where the tourniquet was used for more than an hour.⁷ This was much higher compared to the 22% of patients who recorded nerve palsy in cases where the tourniquet time was less than 15 minutes.⁷ This study also reported that the most commonly affected muscles were the quadriceps.⁷ Some authors have suggested that two hours of consecutive tourniquet time is acceptable.⁸ Klenermann reported that with regard to ischaemia-related nerve injuries, three hours should be regarded as the upper limit of safety.⁹ In our case, we used a

pneumatic tourniquet with a sustained pressure of 300 mmHg for 75 minutes, which is well within the acceptable safety range.

Clinical studies have shown that direct pressure exerted by the tourniquet is usually regarded as the aetiology of the nerve lesion.^{9, 10, 11} However, some authors regard prolonged ischaemia as the main factor responsible for nerve palsies.¹² Reid *et al* showed that pressure needed to maintain a bloodless field for surgery was 255 mmHg for upper limb surgery and 305 mmHg for lower limb surgery.¹³ There have been reports where tourniquet-induced nerve palsies have occurred as a result of an undesired increase in tourniquet pressure due to a faulty gauge.¹⁴ In our case, the tourniquet pressure was maintained at 300 mmHg throughout surgery. Because the tourniquet pressure was well within the acceptable range, this is unlikely to be the predominant causative factor for our patient.

Our patient underwent a total knee replacement under spinal anaesthesia. Injury to the femoral nerve caused by spinal anaesthesia has not been previously described. The use of spinal anaesthesia is likely to affect a nerve root rather than a peripheral nerve. Hence, the clinical features would be specific to the affected dermatome and myotome. This was not the case in our patient.

Conclusion

Based on the literature, tourniquet-induced nerve damage is not uncommon. Peripheral nerve injury is likely to impair the rehabilitation process post-surgery. We consider the femoral and saphenous nerve palsies in our case were caused by the pneumatic tourniquet. Tourniquet-induced nerve injuries can occur despite the tourniquet pressure and time applied within the defined safe limits. Clinicians should be aware of this possibility following surgery performed with a pneumatic tourniquet and consider investigating patients with clinical features of peripheral nerve lesions and/or persistent poor rehabilitation.

Corresponding author

Mr. K. Jha

Orthopaedic Consultant, Department of Orthopaedic Surgery,
The Bradford Teaching Hospitals NHS Foundation Trust,
Duckworth Lane, Bradford BD9 6RJ.

Tel: 01274 364458

Fax: 01274 366574

Email: dhannygomez@hotmail.com / jhafamily@hotmail.com

References

1. Rorabeck CH, Kennedy JC (1980). Tourniquet-induced nerve ischaemia complicating knee ligament surgery. *Am J Sports Med* 8: 98-102.
2. Rose HA, Hood RW, Otis JC, Ranawant CS, Insall JN (1982). Peroneal nerve palsy following total knee arthroplasty. A review of The Hospital for Special Surgery Experience. *J Bone and Joint Surgery* 64-A: 347-351.
3. Guanche CA (1995). Tourniquet-induced tibial nerve palsy complicating anterior cruciate ligament reconstruction. *Arthroscopy* 11: 620-2.
4. Kornbluth ID, Freedman MK, Sher L, Frederick RW (2003). Femoral, saphenous nerve palsy after tourniquet use: a case report. *Arch Phys Med Rehabil* 84(6): 909-11.
5. DiStefano VJ, Kalman VR, O'Malley JS (1996). Femoral nerve palsy after arthroscopic surgery with an infusion pump irrigation system. A report of three cases. *Am J Orthop* 25: 145-8.
6. Dobner JJ, Nitz AJ (1982). Postmeniscectomy tourniquet palsy and functional sequelae. *Am J Sports Med* 10: 211-4.
7. Saunders KC, Louis DL, Weingarden SI, Waylonis GW (1979). Effect of tourniquet time on post-operative quadriceps function. *Clin Orthop* 143: 194-9.
8. Fox IM, Mandracchia V, Jassen M, Chu J (1981). The pneumatic tourniquet in extremity surgery. *J Am Podiatry Assoc* 71: 237-42.
9. Klenerman L (1980). Tourniquet time - how long? *The Hand* 12 (3): 231-4.
10. Bolton CF, MacFarlane RM (1978). Human pneumatic tourniquet paralysis. *Neurology* 28: 787-93.

11. Love BRT (1978). The tourniquet. Aust NZ J Surg 48: 66-70.
12. Denny-Brown D, Brenner C (1944). Paralysis of nerve induced by direct pressure and by tourniquet. Arch Neurol Psychiat 51: 1-26.
13. Reid HS, Camp RA, Jacob WH (1983). Tourniquet haemostasis. A clinical study. Clin Orthop 177: 230-4.
14. Aho K, Sainio K, Kianta M, Varpanen E (1983). Pneumatic tourniquet paralysis. Case report. J Bone and Joint Surg Br 65 (4): 441-3.

[Home](#) | [Journals](#) | [Sponsors](#) | [Medical Books](#) | [PubMed](#) | [Contact](#)

Copyright Internet Scientific Publications, LLC, 1996 to 2008.