Are routine postoperative X-rays needed following surgery for hallux valgus? An evaluation of their use after scarf osteotomy

RICHARD J MURPHY¹, CHRISTOPHER M BLUNDELL²

¹Sheffield University Medical School, Sheffield, UK

²Department of Orthopaedics, Sheffield Foot and Ankle Unit, Northern General Hospital, Sheffield, UK

ABSTRACT

INTRODUCTION Postoperative X-rays, following a scarf osteotomy, are generally carried out as routine. The aim of this study was to assess the value of performing such investigations.

PATIENTS AND METHODS Retrospective data were collected regarding all scarf osteotomies performed by three consultant orthopaedic surgeons at a large teaching hospital. A review of routine postoperative X-rays was carried out.

RESULTS A total of 274 scarf osteotomies were included in the study. Of these, 95% were followed by at least one routine postoperative X-ray. In total, 412 X-rays were performed of which 11% were not commented upon by a radiologist or a surgeon. Of the X-rays with comments from both specialists, only one case was reported as abnormal by both radiologist and surgeon, with no change in management made as a result of these reports. In two cases, changes to standard management were made on the basis of the routine postoperative X-rays and only one of these was implemented solely on the basis of the routine postoperative images.

CONCLUSIONS The value of postoperative X-rays following a scarf osteotomy is questionable. We propose, on the basis of this study, that, unless clinically indicated, the routine use of postoperative X-rays following a scarf osteotomy should be abandoned.

KEYWORDS

Hallux valgus – Scarf – Osteotomy – Bunion – Postoperative X-ray

CORRESPONDENCE TO

RJ Murphy, c/o Mr CM Blundell, Consultant Orthopaedic Surgeon, Sheffield Foot and Ankle Unit, Northern General Hospital, Sheffield S5 7AU, UK
E: richardmurphy@doctors.org.uk

Hallux valgus is a common cause of forefoot deformity and pain, often requiring surgical intervention in order to achieve symptom relief. A procedure increasingly used for correction of hallux valgus is a scarf osteotomy of the first metatarsal and is often performed in conjunction with other forefoot surgery.^{1,2} This procedure has been shown to be reliable and effective as a method of correcting deformity and reducing symptoms in patients with hallux valgus.^{3,4} Postoperative X-rays are generally carried out as routine following such a procedure. To date, there have been no studies published to evaluate the use of postoperative images following hallux valgus surgery.

The aim of this study was to review all postoperative X-rays carried out routinely following scarf osteotomies in our population, and to determine the value of these investigations by measuring the impact these X-rays had on subsequent management.

Patients and Methods

All scarf osteotomies performed for correction of hallux valgus under the care of three consultant orthopaedic surgeons at the Northern General Hospital, Sheffield, UK between December 1998 and January 2005 were included in the study.

A list of scarf osteotomies performed was generated by reviewing the complete operation notes for each surgeon and recording all instances of the procedure, whether performed in isolation, or simultaneously with other surgical intervention. All postoperative X-rays that had been performed in each case were identified by searching the radiology database for any images taken of the foot on, or since, the date of each operation. The database contains a complete record of all radiographs performed and the full text of any radiology reports written. Details of all films and

radiology reports carried out following each procedure were recorded. The case notes for each patient were reviewed to assess whether any variations to standard management had taken place as a direct result of the routine postoperative films.

A 'routine' postoperative X-ray was defined as both anteroposterior and lateral plain X-rays of the foot performed following scarf osteotomy with surgery being the only indication for the imaging. If X-rays were clinically indicated for reasons such as unexplained pain, residual deformity or infection they were not considered to be 'routine' and were, therefore, excluded from evaluation.

Results

All scarf osteotomies carried out under the care of three consultant orthopaedic surgeons were studied. A total number of 274 scarf osteotomies were performed on 206 patients between December 1998 and January 2005. Of the patients studied, 189 (92%) were female and the total population ranged from 17–82 years of age on the date of operation, with a mean age of 49 years. Of the procedures, 145 (53%) were left sided. Bilateral scarf osteotomies were carried out on 67 patients (134 procedures) and, of these, 55 patients (110 procedures) had both feet operated on simultaneously. Fourteen of the scarf osteotomies were performed in isolation, 254 (93%) of the operations included an Akin osteotomy of the great toe and 106 (39%) of the operations included a variety of other additional forefoot procedures.

Figure 1 demonstrates that, for 139 procedures conducted, one routine postoperative X-ray was carried out, for 90 procedures there were two X-rays, while for 31 procedures three X-rays were done. For 14 procedures, no routine postoperative X-rays had been carried out. Therefore, after surgery, 95% of the procedures were followed up by routine postoperative X-rays.

The variability in the number of routine X-rays performed following each procedure could not be accounted for despite detailed review of the case notes. The total number of routine postoperative X-rays carried out for the 274 procedures was 412.

Table 1 shows that there was a large variability between cases in the timing of carrying out routine postoperative X-rays.

Figure 2 shows that reporting and documentation of comments regarding routine postoperative X-rays was incomplete. In 45 (11%) of cases, no comment about the X-ray by either a radiologist or a surgeon had been made. For about half (49%) of the X-rays performed, comments by both a radiologist and a surgeon were documented.

Figure 3 shows that, of the 200 routine postoperative X-rays that were commented upon by both a radiologist and a surgeon, 18 (9%) were reported as showing an abnormality by at least one of the specialists. On one occasion (0.5%), both specialists agreed upon the presence of an abnormality. Both specialists reported the X-ray as showing some persistent metatarsus primus varus with a wide inter-metatarsal angle; the surgeon also commented that the lateral sesamoid of the first ray remained dislocated. There was no management change as a result of these reports.

In two cases, there were changes to standard management made on the basis of routine postoperative X-ray findings. In the first case (Case 1), a patient without symptoms had an extension of their time spent in a forefoot cast by 4 weeks due to a delayed union noted on the routine X-ray taken 33 days postoperatively. In the second case (Case 2), a broken wire was removed. A routine postoperative X-ray had been taken on the day of surgery but the presence of the wire in the foot was not noted on this X-ray until the patient returned complaining of pain 2 weeks later. Both management changes were implemented on the evidence from the first postoperative X-ray. None of the 152 'second' or 'third' follow-up images had any influence on management.

Table 1 Timing of routine postoperative X-rays

	Number of days postoperatively		
	First X-ray	Second X-ray	Third X-ray
Range	0–187	14–391	54–833
Mean	18	95	242
SD	26	97	189

Figure 2 Reporting of all postoperative X-rays.

Discussion

Postoperative imaging is generally considered to be routine following most orthopaedic procedures. In the absence of any guidelines to the contrary, this practice has been extended to scarf osteotomies, with 95% of the procedures included in this study being followed up by at least one routine postoperative X-ray. Only two management changes were implemented on the findings of the 412 X-rays considered and, of these, only one management change was indicated solely on the basis of the routine postoperative X-ray findings. This evidence brings into question the value of postoperative X-rays following a scarf osteotomy.

Williams⁵ has stated that the justification for performing an X-ray should be based upon the 'clinical benefit, cost, convenience and availability' of the investigation.

When deciding whether or not an X-ray should be performed, one must consider exposure to ionising radiation, a risk that may be justified by 'the practitioner showing a sufficient net benefit for the investigation'.⁶ This 'net benefit' takes into account the clinical benefit of the investigation and the radiation dose. Despite the radiation dose required for plain films of the foot being very small, the 'net benefit' of carrying out a postoperative X-ray for these procedures has been shown by the evidence above to be extremely low.

Figure 3 Reporting of postoperative X-rays commented upon by both a radiologist and a surgeon.

Other factors one must take into account when considering the routine use of X-rays are cost, convenience and availability of the investigation. The NHS cost of carrying out and reporting a set of AP and lateral plain X-rays of the foot is £25.⁷ This charge includes the materials and personnel required to produce the image and to generate a report. Further hidden costs of the procedure include those associated with radiology department delays due to high demand for imaging and the subsequent delays to outpatient clinics. In addition to the financial cost of carrying out the X-rays is the inconvenience incurred by staff and patients in order for the X-rays to be performed.

There are medicolegal implications associated with the use of postoperative X-rays. The radio-opaque nature of bones and metalwork lend themselves to being documented in the form of X-rays following orthopaedic surgical intervention, unlike many other surgical disciplines. As a consequence, it has almost become standard practice to document orthopaedic surgery postoperatively in this way. Perhaps this is done because it is possible, rather than to exercise any justifiable clinical benefit. The rationale behind this practice suggests that, should problems occur following surgery, a visual record of what was done at the time has been documented. In the event of litigation following a scarf osteotomy, a routine postoperative film would document the position of the bones and metalwork following surgery. Unlike many other orthopaedic procedures, however, where radiological appearance may give a good representation of the clinical outcome of surgery, the success of surgery for correction of hallux valgus is primarily a clinical assessment judged by the restoration of function and reduction of pain for the patient. With this in mind, the medicolegal value of such radiology maybe limited.

This study did not assess the degree to which a patient is re-assured by a routine postoperative X-ray. The clinical value of such X-rays has been shown to be limited; it is, therefore, questionable whether the re-assurance of a patient by having a routine postoperative X-ray taken is sufficient justification for the investigation.

We have evaluated a large number (412) of routine postoperative X-rays. A rare major complication is likely to manifest in symptoms and therefore would, in our practice,

necessitate a non-routine postoperative X-ray. It is possible, however, that a major complication could occur without there being any symptoms and would only be seen on a routine postoperative film. Our large sample size leads us to believe that this is an unlikely occurrence.

On the basis of this study and the variability shown in terms of postoperative imaging, we have now instituted a standardised postoperative regimen. Patients undergoing scarf osteotomy for correction of hallux valgus no longer receive routine postoperative X-rays. Patients presenting postoperatively with an indication for X-rays will have them taken as part of a thorough assessment of their new clinical presentation. We are prospectively studying scarf osteotomies carried out without routine postoperative X-rays.

Conclusions

We have shown that routine postoperative X-rays following a scarf osteotomy are unnecessary. We propose, on the basis of this study, that, unless clinically indicated, the routine use of postoperative X-rays following a scarf osteotomy should be abandoned.

References

1. Barouk LS. New osteotomies of the forefoot and their therapeutic role. In: Valtin B. (ed) *Forefoot surgery*. Paris: Expansion Scientifique française, 1996: 49–76.
2. Barouk LS. Scarf osteotomy for hallux valgus correction: local anatomy, surgical technique, and combination with other forefoot procedures. *Foot Ankle Clin* 2000; **5**: 525–8.
3. Jones S, Al Hussainy HA, Ali F, Betts RP, Flowers MJ. Scarf osteotomy for hallux valgus: a prospective clinical and pedobarographic study. *J Bone Joint Surg Br* 2004; **86**: 830–6.
4. Girtler R, Fertschak W, Schwagerl W. The scarf osteotomy in hallux valgus – a retrospective study, clinical and radiological results. *J Bone Joint Surg Br* 2004; **86 (Suppl III)**: 327–8.
5. Williams J. Is there a benefit in promoting the concept of radiation risk? *Br J Radiol* 2004; **77**: 545–6.
6. *The Ionising Radiation (Medical Exposure) Regulations 2000*. UK Statutory Instrument No. 1059, 2000.
7. Department of Health. *NHS Costing Manual Version 4*. London: Department of Health, 2003.