INTRAOPERATIVE DIGITAL RADIOGRAPHY IN TOTAL HIP ARTHROPLASTY (THA)

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PURPOSE OF THE STUDY

Over the last few years low dose digital radiography has all but replaced traditional chemical image processing. This appears to have created a paradigm shift in the suitability of intraoperative radiographic guidance for total hip arthroplasty. It is the purpose of this poster to describe our preferred technique and assess its reliability in achieving the desired parameters of a successful THA.

METHODS

- A consecutive prospective evaluation of 150 primary total hips employing intraoperative digital radiography (DR) was carried out.
- An anteroposterior (AP) pelvic radiograph with the patient in the lateral decubitus position was obtained for all hips (Fig. 2). The orientation of the intraoperative film was matched to that of the preoperative AP pelvic radiograph (Fig. 1). The image was taken after traditional placement of the acetabular component and best estimate of femoral trial size, position, and head and neck length (Fig. 3).
- The DR system produced an image within 6 seconds of exposure. This trial radiograph was then used to make adjustments. Given that the cassette does not have to be moved for image processing, a precise AP film was obtained by simply adjusting the operating table. 2-3 minutes were allotted for each film.
- Corrections to stem size, cup position, screw length and position, limb length, and offset were made based on this intraoperative AP pelvic radiograph.
- The final intraoperative image was compared to a postoperative standard radiograph in supine position at 2 weeks after total hip arthroplasty to verify the validity of using intraoperative digital radiography (Fig. 4). Abduction angle, limb length, offset, and canal fit and fill were assessed for confirmation of the validity of the intraoperative imaging technique.

METHODS

Figure 1. Preoperative reference radiograph

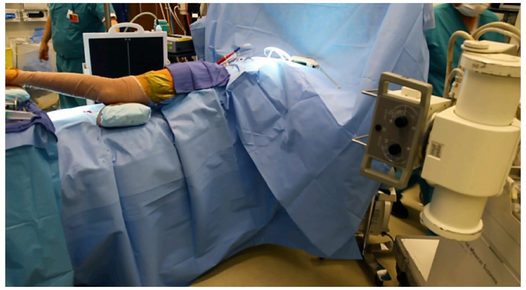

Figure 2. Patient in lateral decubitus position for intraoperative radiograph

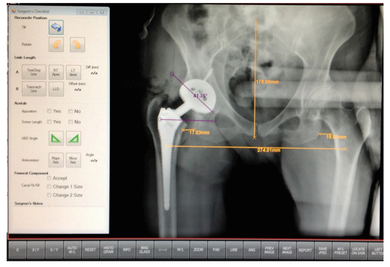

Figure 3. Digital intraoperative radiograph with surgeon's checklist and measured parameters

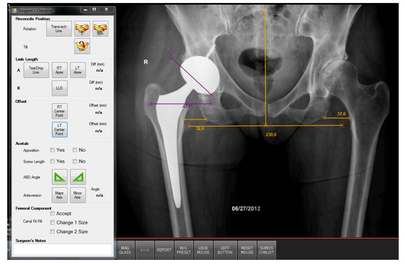

Figure 4. Standard postoperative radiograph surgeon's checklist and measured parameters

RESULTS

- Acetabular abduction angle was determined intraoperatively with a mean of 43 degrees (range, 35 to 48 degrees). In all cases, these measurements were within 2 degrees of the postoperative measurements performed on standard supine radiographs.
- Adjustment to cup angle based on the intraoperative image was performed in 10% of cases, apposition was within 2 mm 100% of the time, and re-seating of the cup was carried out in 1 hip.
- Femoral component was upsized by 1 size in 55% of cases and was determined to be neutral in 92% and between 3 and 5 degrees of varus in 8% of patients.
- Postoperative limb length discrepancy and femoral offset were measured within 2 mm of the intraoperative measurements in all hips.

CONCLUSIONS

Intraoperative digital imaging is a reliable tool for achieving the desired radiographic results in THA. The technique is efficient and affordable. The high rate of success in this series suggests that this technology should contribute to a paradigm shift in the standard of care in THA.

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