Operating Theatre Photography for Orthopaedics and Aesthetic Surgery

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The aim of this paper is to examine the author's personal experience and practice in operating theatre photography. The ways of working are personal to the author but hopefully will help others in undertaking this type of work.

INTRODUCTION

There are still very few papers about operative or surgical photography; those by Morris in 1995[1] and 1996[2] have an American perspective and Bryson in 1999[3] looked specifically at photographing personal injury cases. The chapter by Williams and Nieuwenhuis in 1992[4] on Clinical and Operating Room Photography is strong on the clinical side but contains less information about operative photography. Other than these, the literature consists of 'how to' papers for surgeons or others often just quick guides to cameras and how to use them. This is disappointing as operative photography plays a key part in a clinical photographer's role.

The author admits to possessing a distinct advantage in working in the operating theatre, due to a year spent working as Theatre Porter in 1976 when the range of work was more like that of an Operating Department Assistant rather than only taking patients to and from theatre. Working in an operating theatre environment enables one to learn from the inside how things function, how surgical teams work together and the nuances of what one should and shouldn't do.

Purpose of theatre photography

Operative records are used in many ways:

- For patient records
- To record new operative techniques for journals, book publication and as part of research protocols.
- For medicolegal records in civil or criminal cases[5].
- To provide teaching materials for trainee doctors and surgeons[6].
- For patient education[7] and explanation post-operatively, including for television programmes to go alongside videos, e.g, 'Your Life in their Hands'.
- Commercially for equipment manufacturers to support marketing and sales, including surgical training.

The photographer and the equipment

You and your equipment constitute a hazard within the working environment of the operating theatre. How you behave and work help to ameliorate the dangers you pose. In advance of your visit you should make yourself aware of the particular protocols for entering and leaving the operating theatre. The protocols may be stricter in situations where a large number of theatres are working simultaneously.

Working in theatre is rather like being invited to a sophisticated party: you should behave impeccably and try not to put a foot wrong with the hostess (the scrub nurse in charge of the operation) or the guest of honour (the consultant surgeon) and get along with the other guests (anaesthetist, registrar, runners, theatre nurses) in such a way that you can be sure you will be invited back!

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To prevent cross-infection, the usual cleaning procedures should be carried out before your equipment enters the theatre. However, the dangers go beyond this. It is inevitable that you will have to put your equipment down somewhere if you have brought everything you can possibly need, including spares of some items. Each operating theatre design will be different, but you should find somewhere close to where you are working to put your equipment down. The floor is often the only available place, so choose a spot that is (depending on which battery system you are using) close to an electrical socket and where no one is likely to walk past and trip over your case. Make sure it is not near water or other hazards, for example just below a shelf or notice-board that theatre staff need to access. Think before you put your case down and if you are unsure, check with the scrub nurse and her team.

Keep things tidy and compact don't have equipment flowing out of your case and onto the surrounding for space. If you are concerned about water or other fluids being sprayed around, close the lid of your case; a hard case with a washable surface is preferable.

Familiarize yourself with operating room procedures. Just watching a number of operations will help you understand how an operation proceeds but don't forget that each speciality has its own way of working. If your theatre visits are but brief and infrequent, it may be a long time before you become confident as a surgical photographer. You have to become part of the working team to fully integrate your photography into operative practice.

When you are using your camera equipment, think about where it is about your body: Is it secure, or can it slip into a sterile area, or cause you to make a sudden jerky movement. Try to keep the cables from powerpack to flash and flash to camera from dangling around. You can wrap them around your arm or make sure you use coiled cables and that the coils haven't become too loose due to stretching. The most common weakness of the camera system is often the flash connector so it is preferable to use a cable with a hot shoe connector as it is less likely to pull out while you are working.

It is important to be aware of your body's dimensions and where you are placing yourself. If you accidentally touch part of the sterile area, don't keep quiet about it. Let someone know so that an extra towel can be placed over the contaminated area. If you know you are going to have to touch an area to get a particular view, for example if you need to lean across the patient and in doing so would touch the sterile towels, let the team know and precautions can taken.

Occasional surgical photography

How you work or collaborate with a surgeon will depend on your working relationship with the person concerned. If you take only occasional photographs for a consultant he/she will know what they want you to do and request it when you get into theatre. When you visit a theatre for this type of request you should make your presence known to the sister or other member of staff acting as scrub nurse as they are in charge of the operating theatre and the operation itself. They will then inform the consultant/surgeon of your presence. If you cannot attract their attention you may need to talk to the staff providing the equipment and other items, the runners.

In this situation it will be operate - stop for photograph - operate - stop for photograph and so on, which means the operation may take longer than normal. This can have consequences where the timing of the operation is critical, for example in orthopaedics and hand surgery. Orthopaedic surgeons often work with a tourniquet to provide a bloodless field of view (*Figure 1*) but this does place a limit on the length of the operation, so photography should be carried out efficiently and not delay or extend a procedure.

Working continuously in theatre

Sometimes one is in theatre for a whole operating list working and recording as part of the team and photographing what the surgeon needs for teaching or demonstration of a condition or procedure.

Success relies on several things:

1. That the photographer knows enough about the operation/condition to know what is needed. In this context it is always useful to watch a specific operation before trying to photograph it.

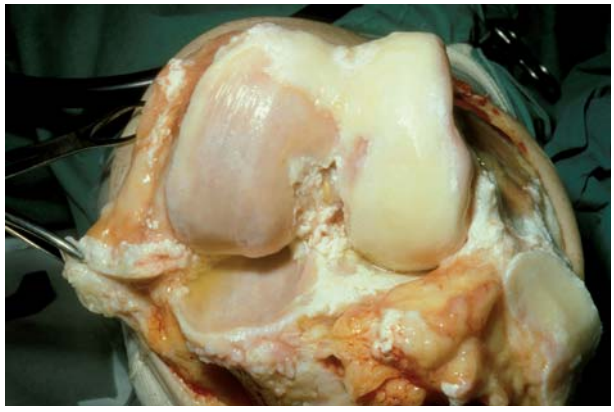

Figure 1. Photograph of knee with severe osteoarthritis before a unilateral knee replacement showing bloodless field of view from a torniquet, note also the white shiny nature of cartilage.

2. That the surgeon is aware of the photographer and any additional views required as the operation proceeds.
3. That in this working relationship surgeon and photographer are working in tandem so photographs are taken at the photographers' discretion.

The advantage of this way of working is that the surgeon does not have to slow down or suspend the procedure for the photographer. If the surgeon does want something photographed they don't need to say so, they simply provide the opportunity for the photograph to be taken knowing that the photographer is following the procedure closely and knowledgeably.

Whilst it is always ideal for the operative site to be clean of blood and free of swabs, this is not always possible. However, when a blood-free view is needed, take the photograph immediately after swabbing, or ask the surgeon politely to clean up the site, remove any swabs or place fresh theatre sheets over messy areas.

The photographer can rarely achieve the surgeons viewpoint, though every effort should be made to do so (*Figure 3*). This can necessitate some awkward positioning, even asking a assistant to hold the flash.

PHOTOGRAPHIC TECHNIQUES

Lens choice and views of the operating field

The lenses the author has found most useful are the Nikon 55 mm macro lens for standard views and Nikon 200 mm macro lens for close-ups. The aperture used with these had been calibrated for full-power flashes for a handheld Metz 45 CT2 flash. The increased availability of high quality zoom lenses means that it is now possible to carry one lens that will cover most situations in theatre.

The real advantage of a 200 mm lens is that it is possible to get a general view of an area even when having to photograph from a distance about 3 metres away. Using a telephoto lens is a great advantage as the working distance is greater, but it is still possible to obtain a reasonable close-up, (*Figure 2*). However, using this lens does depend on having a height advantage those of short stature may need to stand on steps.

This lens also allows one, especially if the surgeon is seated and one is tall enough to work over the surgeons's shoulder, to get a view similar to theirs without touching making contact or distracting them while they operate.

Exposure

In orthopaedics, especially where open surgery of joints is being performed it may be advantageous to underexpose by as much as l/2 a stop because when photographing cartilage it is very easy for this to be recorded as a totally white surface without detail, *(Figures 1 and 2)*.

Figure 2. Oblique view of the knee joint using 200 mm micro lens.

Hand-held Flash

Certain aspects of medical photography require a great deal of dexterity, coordination and in some situations strength; using a hand-held flash together with a camera and lens is one of these. To achieve modelling in the subject the flash must be held off-camera and directed towards the subject.

Figure 3. Operative sequence removal of breast prosthesis and repair of weakened dermal tissue before replacement with new breast implant.

For close-up photography it is usually best to position the flash close to the lens axis. With the lens set at a specific magnification, move backwards and forwards until the desired area is in focus. Working with a fixed magnification/subject distance it is possible to standardise pre-operative views with operative views and post-operative views to give consistency when demonstrating a specific clinical condition or operative technique (*Figure 3*).

Operative Sequence

In creating an operative sequence it is best not to start too close in case the field of view has to increase at a later stage.

Photography in the anaesthetic room

In orthopaedics it is common for a number of reasons for a consultant to examine the patient in the anaesthetic room before surgery begins. The examination might be painful for the patient if done while they were awake, for example in a pivot shift test or when examining the extent of genu varus and valgus[8]. The muscle relaxants used in anaesthesia allow the full extent of a condition to be assessed without the natural 'tensing up' of a patient that is common on normal examination *(Figures 4a and b).*

It can also be useful for some of these examinations to be photographed for teaching purposes or to show the patient post-operatively.

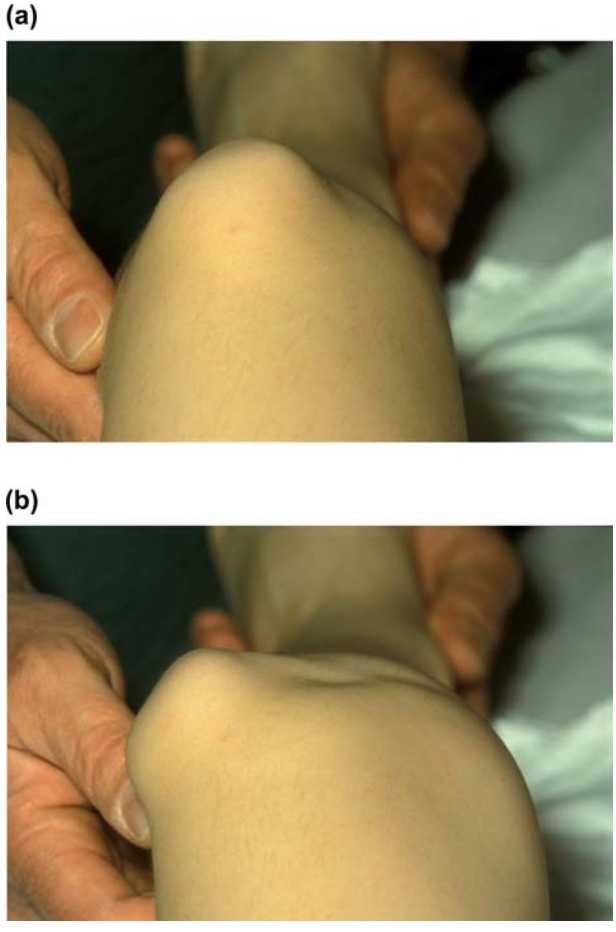

Figure 4. Superior view of the patella taken in the anaesthetic room prior to surgery in a) normal position and b) dislocated.

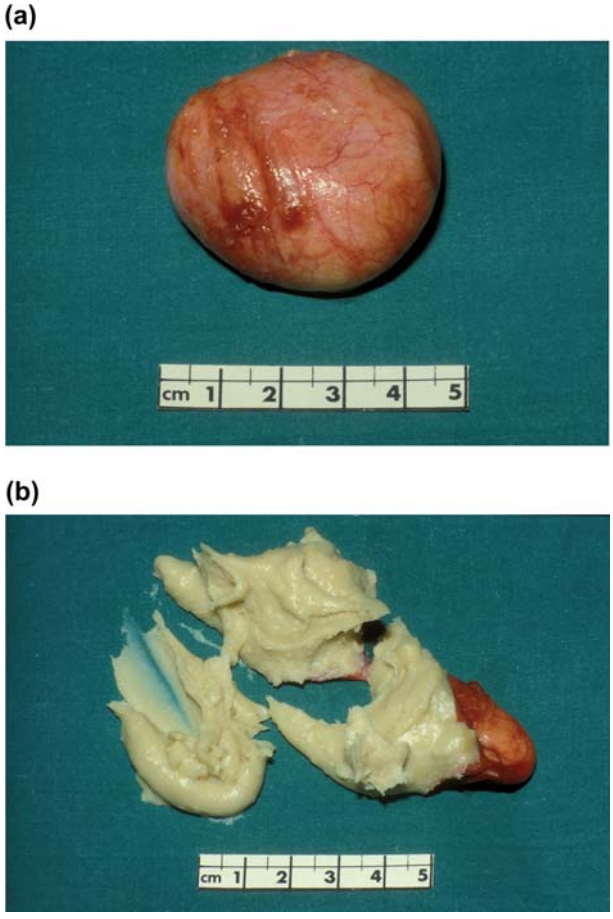

Figure 5. Specimen photographed in the operating theatre a) Whole cyst b) Cyst opened to show sebum.

Photography of surgical specimens

When photographing surgical specimens in theatre they will usually have a supply of green towels which can be used for backgrounds. If the specimen is wet or oozing, use sterile water to wet the towel before placing the specimen onto it. It is always worth carrying measuring scales into theatre for use with specimens. Taking photographs in theatre also offers the possibility for the specimen to be cut or opened in order to demonstrate the pathology *(Figures 5a and b).*

CONCLUSION

There is still a great need for good operative photographs to show updated procedures, new or rare techniques, new implants and materials or uncommon cases, for use in teaching or for medicolegal or even forensic purposes. Learning how to work in theatre, therefore is important for every clinical photographer and student clinical photographer.

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