



A simple technique for intra-operative radiation protection in trauma and orthopaedic procedures

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With the number of orthopaedic surgical techniques using intra-operative radiological imaging, the need for effective methods of radiation protection is increasingly important. We describe a sterile, portable, easy to assemble method of providing adequate protection. This radiation protection shield is cost effective and can potentially reduce the risk of contamination and operating time.

Keywords : ionising radiations ; radioprotection ; intra-operative.

INTRODUCTION

The use of radiological studies such as image intensifiers and mini-C arms in the operating theatre during orthopaedic procedures has become increasingly necessary. Many studies have highlighted the importance of radiation protection and the potential risks to theatre personnel (3,4). In 2007, the Association of Perioperative Registered Nurses (AORN) recommended that lead protection should be used for intra-operative ionising radiation protection. A 0.25mm lead rubber apron and skirt-and-top apron are the most frequently used types of radiation protection used by the surgeon, scrub nurse and assistant in the UK (3). The weight of the 0.25mm rubber lead apron is approximately 15lbs. Khalil *et al* (1) suggested that it could induce a pressure of 300lbs per square inch on the intervertebral disc spaces. It has been proposed to be the mecha-

nism of back pain among orthopaedic surgeons and interventional cardiologists (2).

Despite the potential radiation risk, many surgeons choose not to wear a heavy lead apron under their sterile gowns, especially if radiation exposure only occurs for a brief time period. Some surgeons put on the lead apron during the operation, but it can increase to risk of contamination and is time consuming. To overcome these problems, we have developed an easy to use, sterile and effective radiation protection method for the operating room.

MATERIALS AND TECHNIQUE

A 0.25 mm rubber lead apron is suspended on a standard clothes hanger from a standard adjustable intravenous (IV) fluid stand (fig 1). The IV fluid stand is adjusted to just below chin height of the operating surgeon prior to sterile draping, with the

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*Fig. 1**Fig. 2**Fig. 3*

standard sterile disposable instrument stand cover for the C arm (fig 2) or Mayo table cover (fig 3). During the operation, when radiation protection is required, the sterile shield can be wheeled into the operative field and positioned between the surgeon and the operating table.

DISCUSSION

Theatre staff can prepare the radiation shield during the operation and it does not cause any prolongation of operating time or contamination of the sterile surgical field. The radiation protection behind the shield is superior to wearing a lead apron, as the barrier is double its thickness. The operating surgeon is not restricted in movement by a lead apron and has improvement in comfort during procedures.

Our sterile portable radiation shield has been welcomed by the Orthopaedic department and theatre personnel. This technique can potentially reduce costs, only one lead apron is required as the

assistant can shield behind the apron and operating surgeon. The equipment required to construct the radiation shield is readily available in most operating departments ; therefore no extra costs will be incurred. In addition, this technique is more hygienic, as direct contact of the lead apron with the surgeon is avoided ; therefore bodily fluids are not transmitted to the apron, e.g. sweat, during a long procedure. The sterile drape can be discarded and the lead apron wiped clean ready for the next procedure.

This is an ideal method of intra-operative radiation protection, especially for procedures where radiological imaging is not anticipated pre-operatively but is required during the operations. In this situation, the surgeons and assistants are not required to leave the operating table to wear the lead apron and re-scrub, risking contamination of the operative field and prolonging the procedure. This technique is most suited to orthopaedic and trauma surgery but can also be used in general surgery such as on table cholangiograms.

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