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# A NEW MECHANICAL DEVICE USEFUL TO INSERT THE DISTAL SCREWS IN INTRAMEDULLARY NAILS

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## Abstract

The development and introduction of the closed locked intramedullary nail into clinical practice has revolutionized the treatment of fractures of long bone. The most difficult and technically demanding part of the procedure is often the insertion of the distal interlocking screws. A lot of efforts have been made during the past years to make it easier. In according with Whatling and Nokes, we can divide the different approaches to this issue in four main groups:

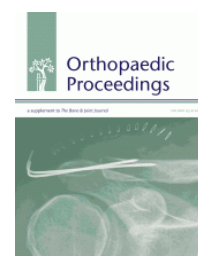
- Free-hand (FH) technique;
- Mechanical targeting devices mounted on image intensifier;
- Mechanical targeting devices mounted onto nail handle;
- Computer-assisted techniques.

In addition of these, recently it has been proposed a navigational system using electromagnetic field.

The main disadvantages of the FH technique, are prolonged exposure to radiation and results depend mostly on the dexterity of the surgeons. FH technique is however the most popular technique.

Our targeting device is included into the mounted on image intensifier group. It consists of 2 radio-opaque rods at right angle to each other: one of this is fixed on the C-arm, whereas, the other is a sliding rod with a sleeve for the drill bit, which is the targeting guide itself. In the realization of this device, we have been inspired by the modification of the FH technique suggested by Kelley et al. To identify the distal holes we used the method described by Medoff (perfect circle). Once that the distal hole is seen as a perfect circle, with the C-arm in later view, the targeting guide is roughly positioned onto this and the drilling and the screwing operations are performed without the need for image intensifier. We used the device in bone models and in 9 clinical cases.

In spite of authors demonstrated that the electromagnetic targeting device significantly reduced radiation exposure during placement of distal interlocking screws and was equivalent in accuracy when compared with the FH technique, the latter is the most


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used technique. Indeed, although all the studies have reported that the radiation exposure to orthopedic surgeon has been below the maximum allowable doses in all cases, there is still the risk of cumulative lifetime radiation exposure. From this point of view, namely the reduction of cumulative lifetime radiation exposure, we think that, paradoxically, our device could be more effective than electromagnetic targeting device, because it can be used in all the orthopedic operations that required a targeting device.

Research

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