A qualitative study on cutting tool materials for bone surgeries

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ABSTRACT
Open reduction internal fixation is a kind of orthopaedic surgery that repairs broken bones from serious accidents or injuries. This procedure is considered for severe bone fractures which cannot be treated by a non-invasive procedure such as splint or cast. Implants such as screws, plates, and nails help to reposition and realign the broken bone fragments internally. An Orthopaedic Drilling is performed on the bones to create enough space to place the implants, and also it will generate enough heat to damage the bone cells, leading to osteonecrosis. This paper aims to present the researched survey report on proposing ceramic cutting tools (drill bit, cutting saw, and burrs) to be introduced in orthopaedic surgeries. A quantitative survey was conducted on 25 orthopaedic surgeons based on a questionnaire regarding cutting tool type, tool material, tool life per surgeries, tool performance, and scope of improvements. In support of the objective, another survey was conducted on 50 tool manufacturers around the world. Survey results showed that almost every surgeon uses the metal-based cutting tool for surgeries; based on that requirement, manufacturers produce metal-based cutting tools. Metal tool properties and proposed ceramic properties comparison is showcased, resulting in Ceramics properties exceeds in almost every property compared to stainless steel, Titanium, and other cutting tool properties.

KEYWORDS
Ceramic materials; Cutting tool materials; Cutting tool type; Metal-based tools; Orthopaedic drilling

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