

Summary

The practice of intramedullary fixation started very early in the 19th century but it has not gained popularity except after second world war and a lot of development has been done to Küntscher's original design until we reached the intramedullary interlocking nails used now whether classic nail with proximal and distal locking screws(reamed or undreamed, static or dynamic), self locked nail from inside (HEN), and callus distraction nail whether mechanical systems like Albizzia and ISKD nail or fully motorized systems like Fitbone nail.

Reaming as a part of preparation for insertion of the interlocking intramedullary nail and the autograft theory and its effect on union has been proved and although the new generation of reamer head decreases intramedullary pressure during reaming and resultant temperature but reaming should not be primarily practiced in polytraumatised patients.

Alloys used to synthesize interlocking intramedullary nail include:- stainless steel (316 LVM, Orthinox, and 22-13-5), titanium alloys(CP Ti, Ti-6Al-4V, and Ti-6Al-7Nb), and cobalt chromium alloys (cast vitallium, and wrought vitallium). These alloys are characterized by being tolerated by the body, restore physiological loading and result in strains and stresses that are compatible with the requirements of the adjacent bony and soft tissue structures, allow all imaging modes with minimum distortion, allow easy implantation and explanation, and maintain the balance between cost and efficiency.

Interlocking intramedullary nail could be coated with combination of SiO_x plasma polymer and metallic silver in the form of high-porosity silver particles forming films with a thickness well below 100 nm, which is chemically inert, insoluble, mechanically and thermally stable, and exhibits high antimicrobial activity.

As regards locking screws; the proximal locking screw could be inserted successfully by the mechanical target device incorporated in the insertion handle of the nail because the distance between the handle and the proximal holes is short. The distal locking screws are inserted either by; the free hand technique, mechanical distal target device, navigator, or recently by fiberoptics' technique which has been proved by the thesis to be highly successful for the accurate determination of the sites of the distal holes of the interlocking nail without the need for image intensifier or navigator taking into consideration that the cost efficiency of this technique is much lower than other techniques.