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Re-inventing bone surgery with CARLO®

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Advanced Osteotomy Tools AG (AOT) is reinventing bone surgery with the world's first, proprietary medical robot, CARLO® (Cold Ablation Robot-guided Laser Osteotome), that cuts bone using cold laser ablation mechanism of action instead of mechanical tools. Although robotic surgery is in vogue, existing devices are actually telemanipulators or positioning aids, where the actual surgical activity continues to be performed by surgeons using conventional mechanical cutting instruments that cannot track the movements of the patient endangering their safety. Alternatively, CARLO® performs contact free interventions enabled by laser light so that, at no time, a mechanical instrument is in contact with the patient and the incision can be interrupted instantaneously if necessary. CARLO® comprises a tactile and certified medical robot, a laser head with a specially developed bone cutting laser, a navigation system and the driving software with a touch-screen based GUI. In this way, the procedure is 100% digital, from the 3D planning to the execution of the cut.

Until now it was impossible to use a laser for bone cutting in surgery, mostly because the lasers and/or the mechanism-of-action employed resulted in the narcotization's of the surrounding bone tissue precluding healing. AOT succeeded in developing a miniaturized laser and a proper cooling method so that the cut surfaces are not exposed to heat facilitating healing. Besides, the debris particles are ejected in contraposition with surgeries based on mechanical cutting tools that are squeezed into the porous bone structure. Another advantage is the implementation of functional cutting geometries, strengthening primary stability in combination with bio-resorbable implants would replace screwed solid metal implants in almost straight cuts. The focused laser beam is always sharp and sterile and the rendered contacts- and debris-free cuts displays superhuman precision. The real-time analysis of the ejected debris will allow detection of tumor using artificial intelligence replacing conventional biopsies.

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