



Precision Device for Minimally Invasive Bone Fixation

Surgical device for minimally invasive yet accurate fixation of complex fractures with improved surgical outcomes and reduced complications

Overview

This invention addresses the significant challenge of reducing and realigning bone fractures within anatomically confined surgical sites, such as the mandibular condyle, which accounts for a large proportion of jaw fractures. The technology provides a bone traction assembly featuring a cannula-guided retractable wire that attaches to a bone-secured fixation element, such as a threaded screw. By retracting the wire, the bone fragment is drawn precisely into place, enabling accurate fracture reduction in areas where traditional methods are limited. The inventive step lies in delivering controlled, minimally invasive traction within restricted anatomical spaces, improving surgical outcomes and reducing complications.

Advantages

Precision in confined anatomical spaces: The flexible cannula and wire system allows for accurate reduction of fractures in complex regions like the jaw joint, where conventional tools are often inadequate.

Minimally invasive: The assembly avoids the need for large incisions required by plate fixation, reducing the risk of infection and preserving vital structures such as facial nerves.

Controlled force application: The screw-thread wire actuator enables incremental and consistent traction, preventing over-reduction and bone damage.

Improved patient outcomes: Patients can resume eating soft foods sooner and avoid extended jaw immobilisation, with reduced risk of malocclusion, facial deformity, and nerve injury.

Designed to streamline procedures and minimise reprocessing requirements, offering cost and workflow advantages over traditional kits.

Compared to existing solutions, this assembly formalises and standardises the reduction process, overcoming the variability and risks associated with ad hoc surgical techniques.

Applications

Primary industry classification: Medical devices – neurological diagnostics and monitoring.

Secondary application areas: Digital health, rehabilitation technology, remote patient monitoring.

Technology Status

Development stage: The device has undergone benchtop validation and user evaluation with maxillo-facial surgeons, demonstrating feasibility and usability in a controlled setting (TRL 4–5).

Validation status: The device has demonstrated feasibility and usability through benchtop testing and surgeon evaluations, with further in vivo and clinical validation needed to advance technology readiness

Key milestones: Patent filed; mechanical traction force testing completed.

Market Opportunity

Target industries/applications: Neurology clinics, rehabilitation centres, clinical trials for neurodegenerative diseases, telemedicine, and pharmaceutical research.

Prevalence: Parkinson’s disease affects over 10 million people worldwide.

Multiple Sclerosis impacts nearly 2.8 million globally. Stroke is a leading cause of long-term disability, with more than 12 million new cases annually.

Motor Neurone Disease (ALS) affects approximately 350,000 people worldwide.

Market size estimate: The global neurorehabilitation devices market is projected to exceed \$2.5 billion by 2028.

Unmet needs addressed: There is a strong demand for objective, sensitive, and scalable measures of hand function to support clinical trials, therapy monitoring, and early detection of neurological decline—areas where current assessment tools are often inadequate.



Technology Sector
Med Tech

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Opportunity
Research collaboration
Further development
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