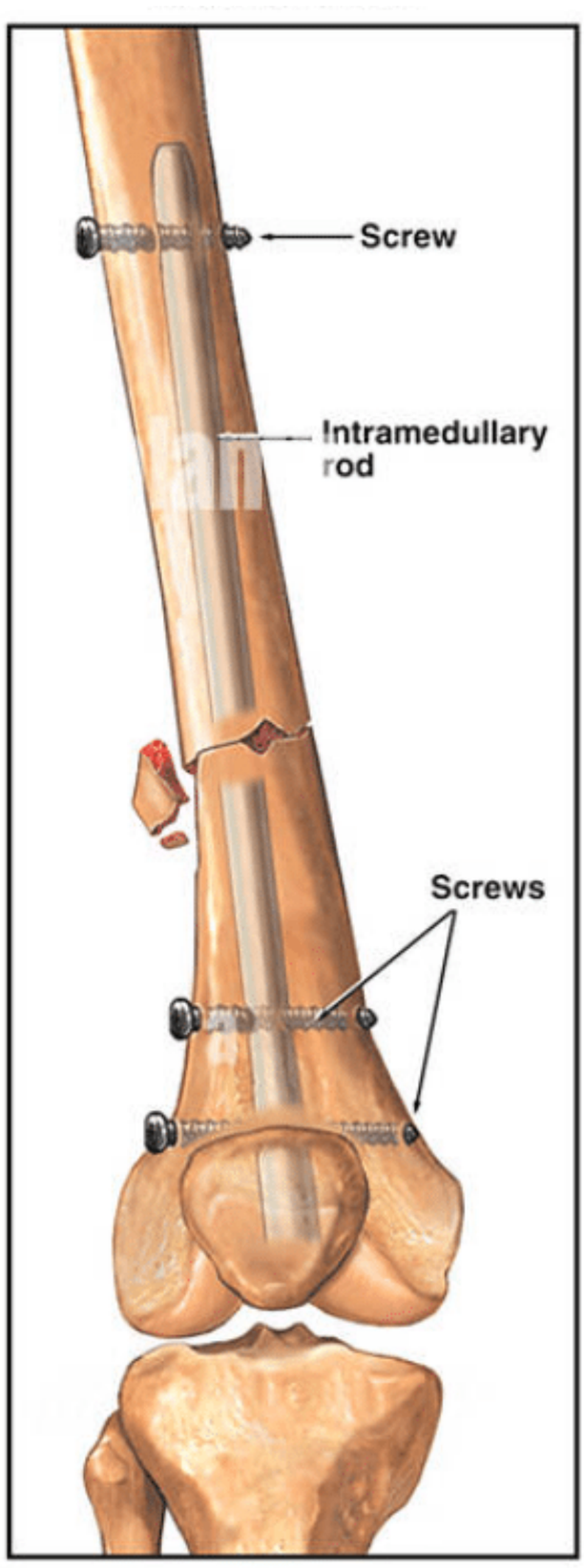
Intramedullary Implant

New-Generation Implant for Distal Femur Fractures, specifically designed for full weight bearing



Post-Surgery

New-Generation Intramedullary rod

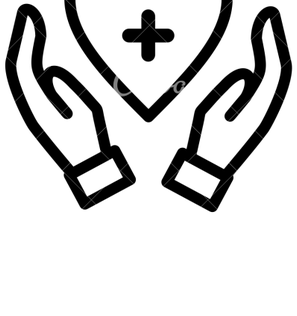
Intramedullary Implant

This design uses a hollow-shaped metallic rod that goes in the medullary cavity by way of antegrade insertion, or inserted from the distal end for patients that do not have a knee replacement. The hollow structure allows the implant to be lighter and preserve liquid-bone marrow for patients with osteoporosis and brittle bone, which makes it ideal for elderly patients. Its intended use is to support the weight of the patient and not deform as a result, and allow distal femur to rehabilitate. There are two main screws that go all the way through the bone and rod to provide structure and to ensure the implant stays in place. There are excess holes in the rod to lower stress-shielding and for screws, as needed by the surgeon depending on the specifics of the fracture and bone porosity.

X-ray View

Anterior View

Design Details



Minimally Invasive Surgery

Small operative cuts to expose joint(s) and insertion [1]

Inclusive Approach

Can also be used for people with knee replacement

Faster Recovery

Low inflection rate, decreased vascular damage, and minimal disturbance to the fracture site [1]

Load-Sharing

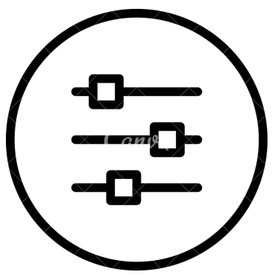
The excess holes decreases surface area which in return decreases stress shielding

Comfortable

Excess holes, thinner screws and less prominent implant than competitors [2]

Resistant

Can support at least 260% of the body weight and not deform [2]



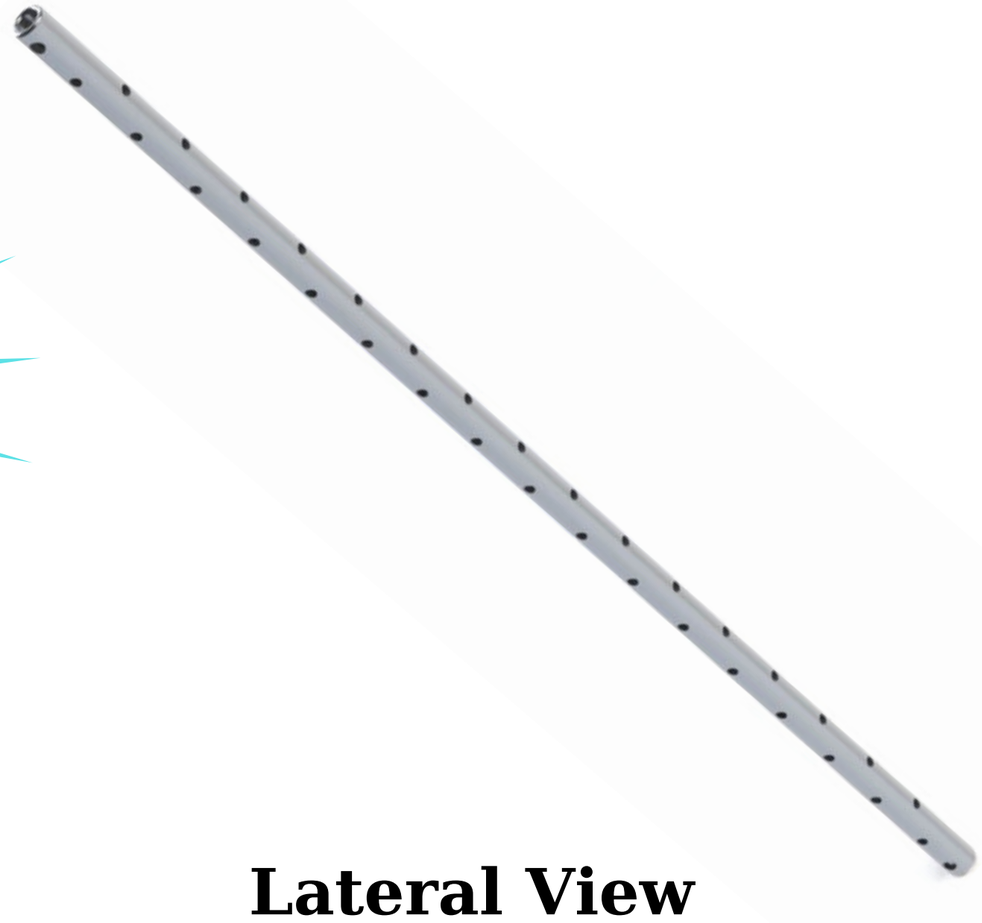
Adjustable

The number of screws and where to insert them are all changeable

Material: Titanium

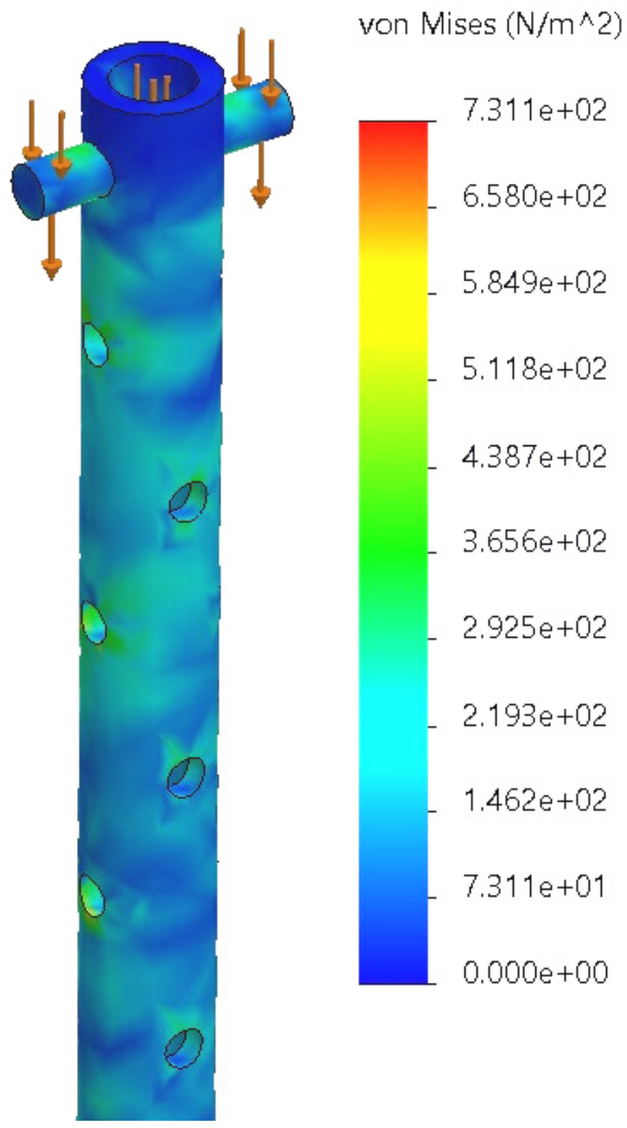
Titanium Alloy (Ti-6Al-4) is chosen as the material for this design due to its following properties:

- It is one of the most biocompatible and non-ferromagnetic metals [3][6]
- It shows excellent corrosion resistance and good hard-tissue compatibility due to its protective oxide film [3]
- Conformational change of proteins nearby titanium implants is minimal due to smaller electrostatic forces [4]
- It is lighter compared to other biocompatible metals, allowing more mobility to senior citizens [5]
- It is a strong metal so it can withstand extreme temperatures and forces which makes it ideal for surgical operations [5]
- It allows immediate weight bearing which speeds up the recovery process [3]



Lateral View

Performance



This new-generation intramedullary implant can withstand excessive loads and not deform as a result. Even at the holes in the middle, the stress does not exceed 600 Pa. The screws equally distribute the force in the implant and help reduce the load on the fracture site, leading to faster recovery. The excess of holes makes this design weigh less and be adaptable to numerous patients, depending on bone porosity. By increasing the number of screws in close proximity, the rigidity can be increased [7].

Additionally, the excess of holes mimic cancellous bone and reduces the stress shielding, terminating any repercussions post-surgery. The use of less prominent cover and thinner screws (5mm) than competitors lead to comfort of our patients as the implant does not lie too close to the surface. The intramedullary feature allows this implant to be not subjected to high bending moments during weight bearing, increasing the stability of this implant [8]. In this way, the femur heals without any misalignment.

References

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