 Improved healing of clavicle fractures using an implantable pre-curved intramedullary rod

Researchers at SUNY Upstate Medical University have developed a new implant for improving the healing of broken clavicles (collarbones).

**Current Problem**
Clavicle fractures are common (2.6% of the ~6.8 million in the US each year). Non-operative treatments can delay healing and sometimes lead to unsatisfactory results such as unfavorable humping, shortening and poor shoulder function, especially when the fracture is mid-shaft (~80%). To improve patient outcomes, clavicles broken mid-shaft are often stabilized by securing a metal plate to the bone with screws, superiorly or anterior/inferior, or using a pin or rod inserted into the bone. Surface-mounted plates are cosmetically unappealing and their removal is complicated. Difficulty with wound healing and scarring is common. Current rods are straight while clavicles are curved, making it difficult to properly secure the clavicle, often resulting in migration, mal-alignment of the fracture, and rotational instability.

**Upstate’s Solution:**
Upstate’s new clavicle implant is a rod or nail that has a unique geometry designed to allow insertion directly into the medullary cavity (central bone cavity where marrow is found) of a fractured clavicle. Its pre-curved geometry (80 to 180 mm radius of curvature) closely matches the natural curvature of clavicles of 90% of the adult population, making Upstate’s rod is easy to insert into the medullary cavity of most fractured clavicles without modification. Once in place it can be anchored medially and laterally by bone screws through predrilled holes in the rod. Upstate’s new rod can easily be inserted into the bone directly through a single small incision in the skin, making the procedure more cosmetically appealing than the more extensive surgery required when using a bulky surface mounted plate or a current straight rod. And unlike surface plates often used to stabilize fractured clavicles, Upstate’s clavicle rod will neither be visible nor require surgical removal after the fracture mends.

**Benefits**
- Improved healing – smaller incision, maintains natural geometry of bone
- Ease of use – pre-curved rod follows the natural curvature of the medullary cavity

Clavicle nail prototypes

CAD showing how the curvature of Upstate’s pre-curved clavicle nail matches that of the clavicle