

Usability testing of Imperial unilateral external fixator using sawbone



Test date: 13 Nov 2020

Conducted by Sarah Stewart

Position: Orthopaedic registrar

Relevant experience

I have used the Hoffmann 3 external fixator set whilst working in the Trauma and Orthopaedic department at the Royal London Hospital, a major trauma centre in East London.

Test method

Assembled fixators, spanner, bone pins, drill, and sawbone femur were provided. Without providing any instruction, the registrar was then asked to install the fixator on the femur assuming there is a mid-shaft fracture.



Registrar's comments

I found the kit relatively easy to use, with the bolts and bar design similar to the Hoffman 3, which made it simple to assemble. One of the main differences was the single size bone pin choice. I believe in the Hoffman 3 set, you have a range of diameters you can use depending on the size of the bone. Although having one size bone pain keeps it much more simple, potentially it would a little too big if used for a forearm fracture for example.

The bolts in this set also don't have the 'clip in' style mechanism that the Hoffman 3 set has. However, I suspect the absence of this mechanism makes the bolts more robust in the set I trialed, and more likely to withstand wear and tear. It results in it taking a little longer to assemble, but I imagine it will be more hardwearing than the Hoffman based on the mechanism of the bolts and the material of the bars and bolts.

Remarks by PDRA's

- The registrar did not use the middle clamps as a guide for the middle pins which could affect the performance of the device.
- Middle pins could have been placed closer to the assumed mid-shaft fracture.
- Most proximal and most distal pins could have been placed closer to the joint.
- The gap between the proximal pins was slightly larger than the distal ones led to a different arrangement of clamps.
- 60 degree approach angle was used, user noted that X-ray would be used if possible for insertion
- Placing all clamps on bar before starting with pins helps, because additional clamps cannot be added afterwards (unlike Hoffmann 'clip' system)
- User did not start with the most proximal and most distal clamps, which made the alignment somewhat more difficult. This is a common practice by surgeons and is expected to be considered by more experienced surgeons.
- Adjustment of the nut to 'hand tight' stops the construct from moving, and allows adjustment of alignment by sliding under light friction, then tighten up once alignment has been achieved.
- Clamps were used to the outside of the bar
- Joint spanning arrangement may also be needed

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Conducted by Louise McMenemy

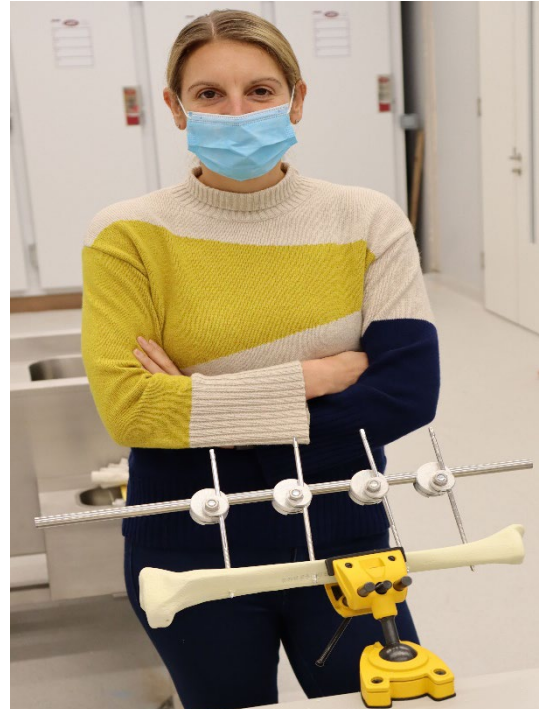
Position: Orthopaedic registrar

Relevant experience

Used in training environment (Hoffmann), but haven't used for possibly 2 years due to out of programme doing my PhD full time.

Test method

Disassembled fixators, spanner, bone pins, drill, and sawbone tibia were provided. Without providing any instruction, the registrar was then asked to assemble the fixator and install it on the tibia assuming there is a mid-shaft fracture.



Registrar's comments

Once I understood the concept of how the parts fitted together it was easy to assemble. The lack of colour coding means there is a need to spend some time getting to grips with it first time, now I know

however I would feel confident using the construct. I like the restriction of the bolt heads (although initially didn't find this intuitive) and single tightening mechanism for both clamps.

Remarks by PDRAs

- The registrar did not use the middle clamps as a guide for the middle pins which could affect the performance of the device.
- Middle pins could have been placed slightly closer to the assumed mid-shaft fracture.
- Most proximal and most distal pins could have been placed closer to the joint.
- Fixator should have installed closer to the bone.
- Same arrangement was used for all clamps.
- Louise said to remember that sometimes in emergency situations xFixes are applied by 2 people in a production-line type of arrangement as it is faster, i.e. one starts and the other finishes the job
- Louise struggled a little to get the rod end to push into the clamp at first, but once it was on, it slid smoothly.
- Note that the flat on one side has no functional use (except rolling off the table!)
- The number of washers could be confusing, and users may not always use them
- Remember that in an autoclave, products tend to change size over time from the high temperature.