

Project: Shoulder Joint Articular Lens

BACKGROUND INFORMATION

The humeral head (Figure 1) is sometimes replaced with a humeral implant (Figure 2). Although it may not appear so in these figures, the humeral head implant is a hemisphere and thus it is well modeled by a half ball lens. The radius of the implant varies from 16 to 26 mm, depending on gender and size.

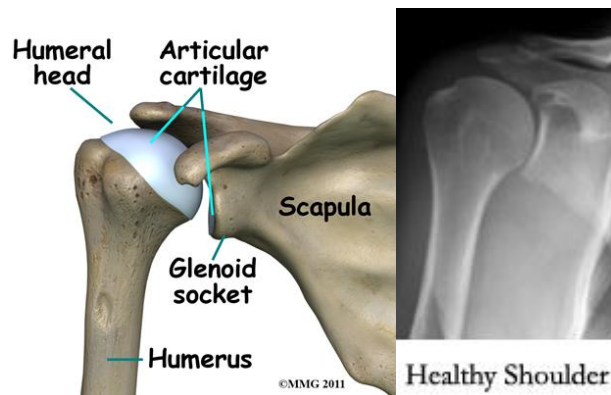


Figure 1: Normal humeral anatomy.

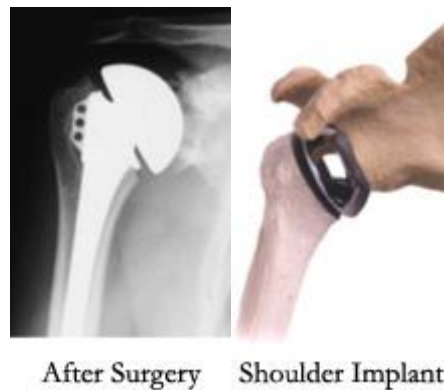


Figure 2: Humeral head replaced by implant with radius of 16 to 26 mm depending on gender and size.

In some cases, the hemisphere implant is placed on the scapula side in what is called a “reverse shoulder implant” system (Figure 3).

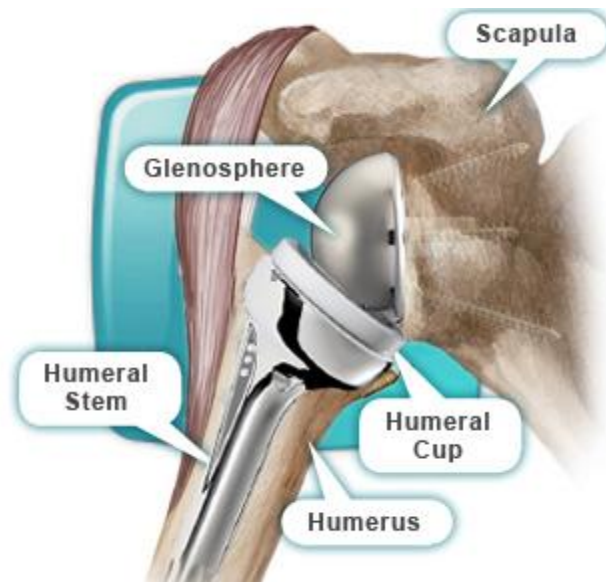


Figure 3: Reverse implant system with hemisphere on the scapula.

PROJECT NEED

Replace the hemisphere implant with a half-ball lens, allowing visualization and imaging measurements of articular contact and/or the surrounding tissues. It is useful to study and quantify articular contact area and contact pressure following joint replacement. Also, it would be useful to visualize some surgical repairs that area adjacent, but come into contact with the joint.

DESIGN CRITERIA

Half-ball lens with radius of 16 to 26 mm.

Require an image acquisition system such as a CCD either immediately behind the lens or off-board. If off-board, then perhaps need fibre optic cable to go from the lens, through the humerus, to the CCD (Figure 4). Figure 4 shows a conceptual illustration, however the details of the collimator are unknown to me. We can accommodate a fibre optic cable of approximately 10 mm diameter.

A lighting source will be needed. Is it possible to send the light up through the fibre optic cable? Can a light source be placed behind the half-ball lens or behind the collimator?

We have a lot of flexibility given that this is for laboratory testing in a cadaver model.

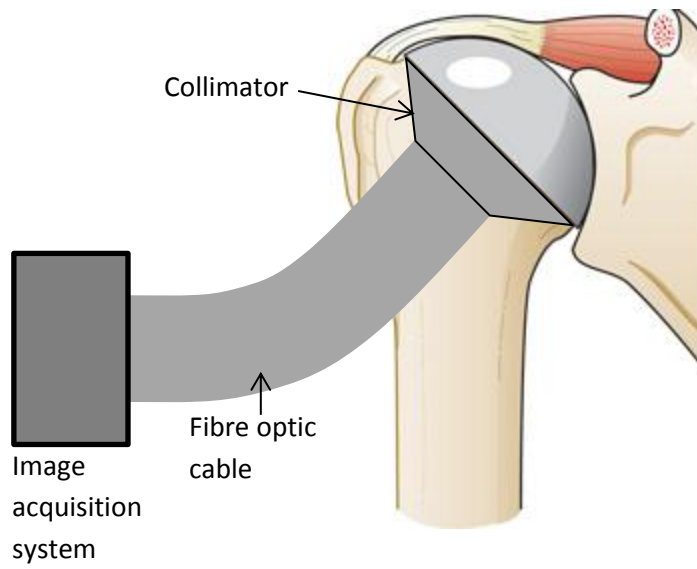


Figure 4: Conceptual half-ball image acquisition system. Cable diameter can be approximately 10 mm.

END