



# Resection Guide For the ARC™ Tissue Conserving (Neck Sparing) Total Hip Stem\*\*\* -Case Report-

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## Abstract:

Neck sparing total hip designs have been advocated as the next step in tissue preserving total hip arthroplasty<sup>1,2,3</sup>. In the proximal femur, the femoral neck and the adjoining medial aspect of the femur in the calcar region show the strongest bone structure (Fig. 1) with a high load capacity to support the stem. There are considerable short-term biomechanical advantages concerning reduced bending and torsional moments of the femoral implant/bone interface<sup>4</sup> with resection at that level, however, historical review has demonstrated less than desirable bone maintenance over time<sup>5</sup>. According to Wolff's Law, the reduction of stresses relative to the pre-implant anatomy would cause bone to adapt itself by reducing its mass, either by becoming more porous (internal remodeling) or by getting thinner (external remodeling)<sup>7</sup>. The ARC™ Neck Sparing stem has a novel internal conical flair that engages the medial calcar and is designed to offload compressive loads maintaining a positive stress transfer to the medial calcar<sup>6</sup>. The combination of neck resection level and angle are important considerations for neck preserving stem designs. This case report demonstrates a new resection guide that has proven to be simple and reliable.



Fig. 1

**Key Words:** femoral neck, stress transfer, resection guide, conical flair

## Introduction:

Tissue conserving neck sparing (Fig. 2) surgery in THA is credited to Prof. Pipino, from Monza, Italy who has been working on this concept for over 30 years<sup>1</sup>. The Apex ARC™ Stem is built off the pioneering work of Pipino, Freeman, Townley and Whiteside with new novel design features. The proximal portion of the stem has a patent pending novel conical flair element (Fig. 3) that is designed to off load compressive loads to the medial calcar. This unique feature has demonstrated positive stress



Fig. 2 Neck Sparing  
Curved Stem

transfer in both FEA modeling and now clinical observations<sup>5</sup>.

Proper neck resection level and angle are important steps in the surgical technique to ensure maximum bone contact with the proximal conical flair<sup>7</sup>. This case report will highlight the advantages of a new neck resection guide designed by the senior author and is now used routinely in the surgical preparation of the ARC™ Tissue Conserving Femoral stem.



Fig. 3 Conical Flair



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## Surgical Technique:

The neck resection is conservative but allows some flexibility to adapt to both patient anatomy and surgical preference. The level of resection (Fig. 4) and the angle of resection should be accurate to ensure optimal conical flair contact. If the angle of the resection is too vertical you can have the stem in slight varus and if the resection is too horizontal the stem (Fig. 5) can be in slight valgus. Neutral or slight varus is the preferred position<sup>7</sup>. (Fig. 6)

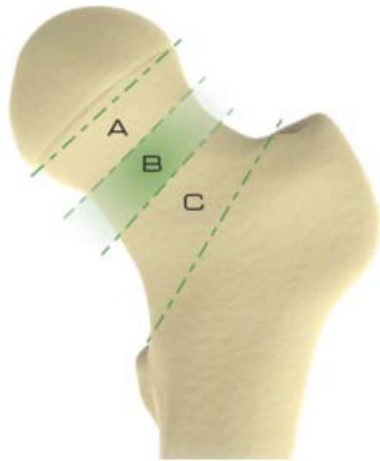


Fig. 4 Possible Levels of Neck Resection (B is preferred)

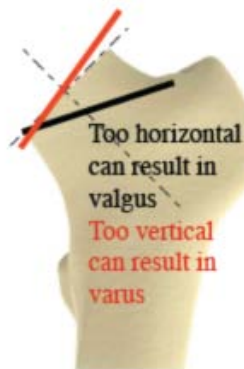


Fig. 5

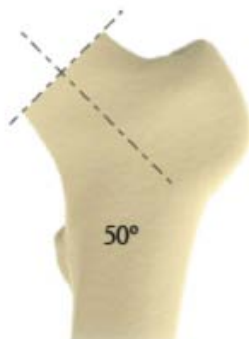
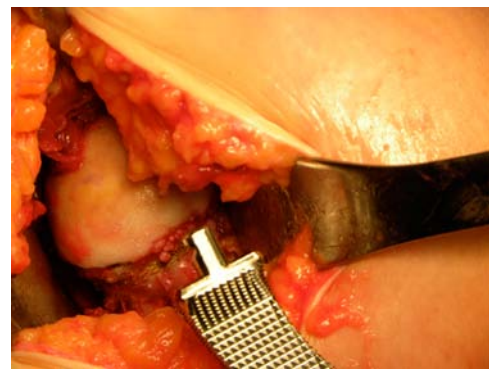
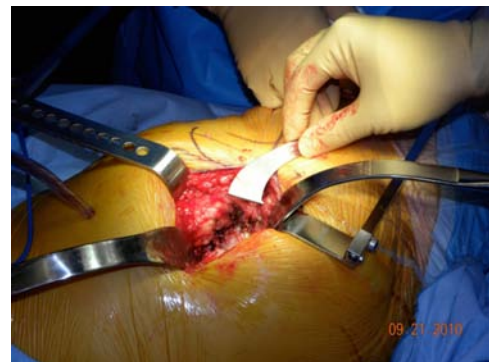


Fig. 6 Proper Angle Perpendicular to Neck

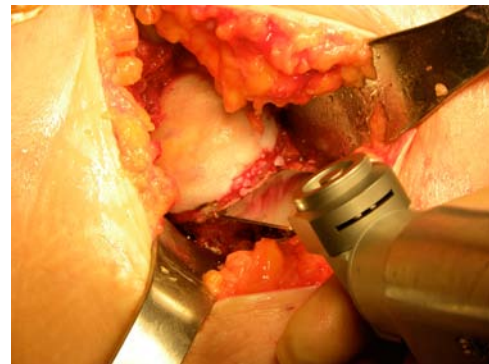
Prior alignment techniques have used a rasp, stem template, or trial stem as a gross resection guide. (Fig. 7)



Rasp as  
resection  
guide,  
Anterior  
approach



Template



Resection



Trial Stem  
posterior  
approach

Fig. 7

These techniques have been helpful, however, they can be difficult to use because of size and exposure.

(Fig. 8) Shows stem slightly above the neck resection. This has not proven to be a problem clinically, but the ideal position has the conical flair engaging the medial calcar. There are examples that a small gap can and does fill in by remodeling (Fig. 9).



Fig. 8 Conical Flair Proud of Resection Line



Fig. 9



(Left) Gap at the Medial Calcar (Right) Gap Filled in at 1 year Follow Up

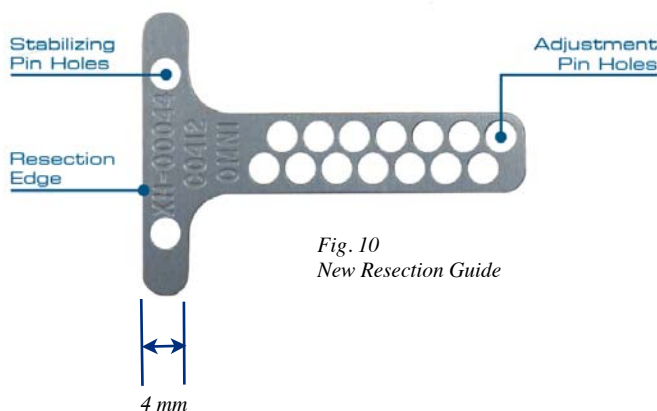


Fig. 10  
New Resection Guide

This guide can be used with any surgical approach that dislocates the femoral head before neck resection.

### Step 1:

Locate Femoral Head Center, and place an unthreaded Steinmann pin (3.2 mm).

### Step 2:

Slide guide onto the head center pin, using any of the adjustment pin holes. Adjust pin position until the guide's resection edge is located 5-8mm below the subcapital level or in the location determined during preoperative planning. Pin holes are located in 2mm increments.

### Step 3:

Orient the guide so it is perpendicular to the neck axis.

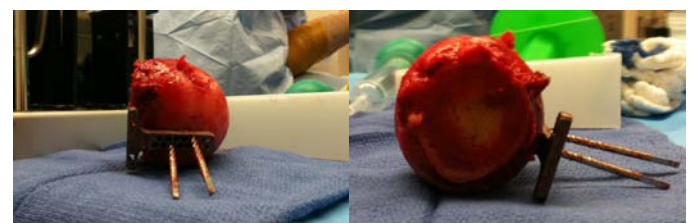
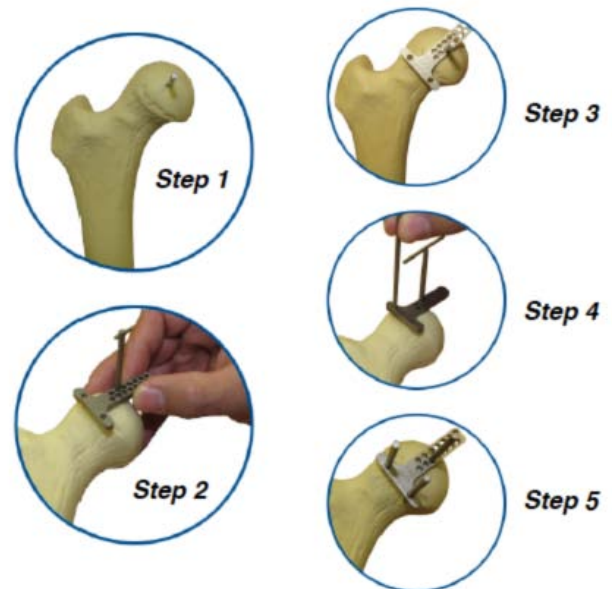
### Step 4:

Secure the guide by driving either one or two pins in the Stabilizing Pin Holes. Alternatively, a second pin through one of the other adjustment holes will adequately stabilize the guide.

### Step 5:

Make resection along the Guide Resection Edge, or use guide to mark resection level with a surgical pen or electrocautery.

*Note: Resection edge bar is 4 mm in height. When the proximal edge is placed at the articular cartilage/neck junction, the saw cut should be approximately 5 mm subcapital.<sup>8</sup>*



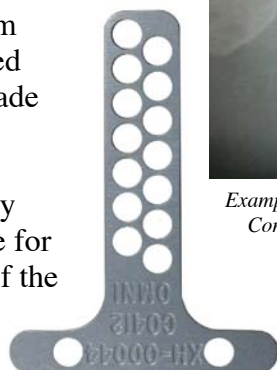
Resected Head and Guide



## Observation and Results:

This guide has been used with repeated success and now is in routine clinical use.

We have found this device to be very helpful in achieving intimate contact between the proximal conical flair of the stem and the resected neck. It has made our resections more accurate which in theory should provide for maintenance of the medial calcar.



*Example of Contact Between Conical Flair and Neck Resection.*

*ARC (Head-Pin) Resection Guide*

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# Tissue Sparing Total Hip Arthroplasty Study Group

The Joint Implant Surgery and Research Foundation has a long history in the study of THA. It began back in 1971 when Professor Charles O. Bechtol, M.D. established JISRF as a nonprofit scientific and educational foundation.

JISRF continues this study with the formation of a new study group of international surgeons and scientists. Findings will be posted on the foundation's web site at [www.jisrf.org](http://www.jisrf.org).

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