

## THE USEFUL-HARMFUL COLLAR IN CEMENTED THR DO WE REALLY DO WHAT WE ARE GOING TO DO?

Zoltán Csernátony, László Kiss, Mónika Füleki, Zoltán Jónás  
Department of Orthopaedic Surgery, Medical and Health Science Center,  
University of Debrecen  
[csz@med.unideb.hu](mailto:csz@med.unideb.hu)

### Abstract

We are hereby presenting some purely theoretical mechanical considerations on the danger of the incorrectly positioned collared femoral stem.

**Keywords:** collar, femoral stem, stem loosening, classification, cemented stem, cement mantle

### Introduction

The unanswered question of whether a femoral stem should have a collar or not is only one of the controversial areas of hip replacement. The aim of the collar is to lean against the femoral calcar to diminish stress shielding of the proximal femur<sup>1</sup>. If correctly implanted, a stem with a collar presents a stress distribution pattern closer to that of the normal femur, as described in the literature<sup>2</sup>. In everyday practice there is a tendency not to pay enough attention to this detail. We are not able to prove this statement with references and statistics but if everybody honestly looks around their department, such cases are not so rare. However the non-ideal positioning of the collared stem shows a diverse pattern of positional variations. We believe that all these variations mean different biomechanical conditions. When making a follow-up assesment, it should be useful to correlate such malpositions with the clinical outcome.

### Method

We hereby present a new classification based on the position of the collar of the cemented femoral stems on antero-posterior plane film

X-ray findings. If we consider the more common position patterns of the medial collar as compared to the calcar and the cement mantle, altogether three main groups can be formed as shown on *figure 1*.

- I. In the 'collar-on-bone' group four more subgroups can be distinguished, as follows:
  - a) collar/bone + collar/cement contact,
  - b) collar/bone contact (no room proximally for the cement, which means a virtual linear collar/cement contact),
  - c) collar/bone contact (no room for the cement),
  - d) collar/bone contact + gap (there is room for the cement but the gap is not filled)
- II. In the 'collar-on-cement' group three more subgroups can be distinguished, as follows:
  - a) collar/cement-bone contact (cement interposition transmitting vertical load on the bone),
  - b) collar/cement contact over the top (no bone loading because of short and high collar),
  - c) collar/cement contact at level (no bone loading because of short collar and/or too lateral stem).

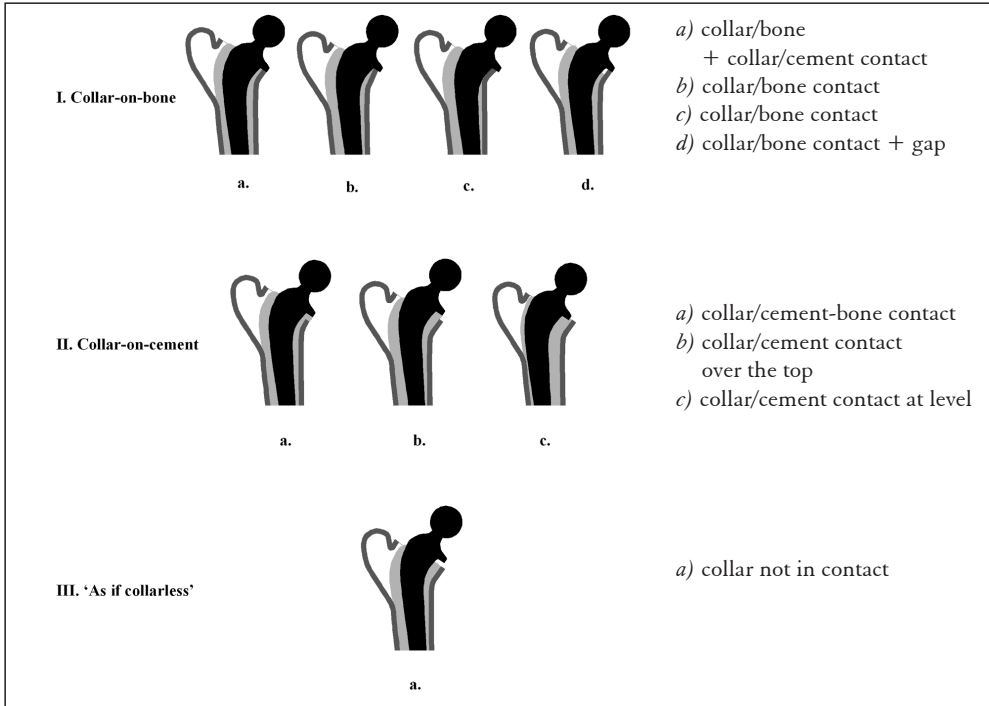


Figure 1. The 8 most common scenarios of the calcar positioning

### III. In the 'as if collarless' group

- a) collar not in contact (the inferior surface of the collar has no contact with the cement nor with the bone).

### Discussion

The most suitable scenario is **Ia** and **Ib** where the collar completely fulfils its role and is also sustained by some cement. **Ic** is widely believed wrong. **Id** and **IIa** are also acceptable

as there is still some vertical load on the cortical bone. While in **IIIa** the stem functions as if collarless. However, the condition of **IIb** and **IIc** is definitely harmful, raising the shear force between the calcar and the cement mantle and facilitating the breaking of the cement mantle<sup>3</sup>.

Based on this purely theoretical consideration, we suggest that more attention is paid to the position of the collar and to bear it in mind when assessing follow up results.

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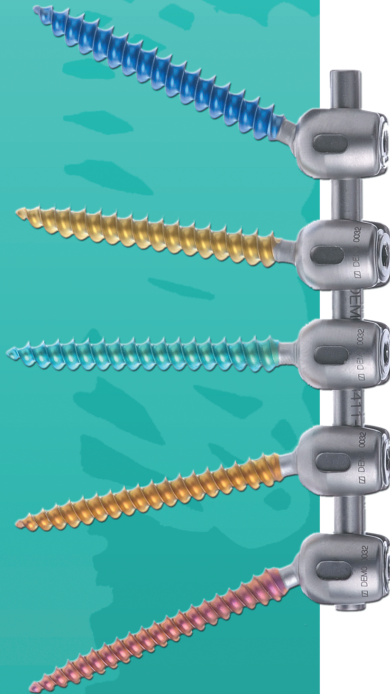
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**Zoltán Csernátóy**

Department of Orthopaedic Surgery, Medical and Health Science Center,  
University of Debrecen  
H-4032 Debrecen, Nagyerdei krt. 98.  
Tel.: (+36) 52 255-815

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