Prof. Dr. A.B. (Arie) van Vugt

**Displaced femoral neck fractures**

What makes the displaced hip fracture special?

Femoral neck fracture is a known problem of course, not only because of the biologics, not only because of the avascular necrosis of the hip but also the biomechanical problems. Especially, when it’s a displaced fracture, it needs a stable fixation.

Be aware of the fact that the rotational stability is not fixed adequately with the screw plate fixation technique and that’s why the Gannet implant was introduced. The combination of the two wings gives a far better rotational stability than the original concept of the compression hip screw.

Do you have scientific evidence?

Of course, the stability has been tested in the laboratory environment, including cadaver bone studies and the rotational stability is double as compared to sliding hip screws. These studies have been published in peer-reviewed journals. Upon these laboratory studies we did a prospective cohort study and compared this in a longitudinal study with our results with the compression screws and cannulated screws. The results from this comparison are a reduction rate of re-operations of 50%.

Till now, 1000 patients have been treated with a Gannet implant. One article (nondisplaced fractures) has just been published, another article (displaced fractures) is under review.
Are many hospitals underestimating their re-interventions?

It is obvious that if you don’t look for your complications you won’t see your complications.

Do you have scientific evidence?

Of course, the stability has been tested in the laboratory environment, including cadaver bone studies and the rotational stability is double as compared to sliding hip screws. These studies have been published in peer-reviewed journals. Upon these laboratory studies we started with a prospective cohort study in several hospitals in the Netherlands. Till now, 400 patients have been included. A new publication has already been reviewed and accepted (200 patients, undisplaced fracture) with promising results.

Could you tell something about yourself?

My name is Arie van Vugt, I’ve more than thirty years experience in trauma surgery. I published my thesis in 1991; the subject was the treatment of intracapsular hip fractures with Dynamic Hip Screws. Later on, I became chair of the guideline committee for the treatment of hip fractures in elderly people in the Netherlands, a cooperation of the Dutch Surgical Society and the Dutch Orthopaedic Society.

We describe a quantitative analysis of undisplaced femoral neck fractures. In a hospital treating 500 femoral neck fractures annually, the distribution would be 125 undisplaced fractures, 105 displaced fractures in biological ‘young’ patients and 270 undisplaced fractures with biological ‘old’ patients. The standard treatment would be internal fixation (IF) for the first two groups and hip replacement (HR) for the biological ‘old’ patients. The distribution is illustrated in Figure 1.

In general, the re-intervention rate in displaced femoral neck fractures amounts to 18 – 38%. In case of 105 patients this yields 29 re-interventions. A re-intervention means removal of the osteosynthetic material and the insertion of a hip replacing device.

The clinical results of the first 1,000 patients treated with the Gannet are becoming available. Eight hospitals in the Netherlands are participating in the study. Independent studies are being organised in Belgium. The outcome of the cohort of patients with displaced fractures and treated with the Gannet is under review for publication; out of 106 patients the result was 14 failures (13.2%). Calculation on basis of 105 patients yields fourteen re-interventions.

By applying the Gannet, a reduction in re-operation rate has been obtained from 29 re-operations in case of sliding hip screw or cannulated screws to 14 re-operations in case of Gannet. This means that at least fifteen patients are circumventing a re-operation and subsequently hip replacement. These patients are evading additional suffering.

Not just the patients are benefitting, it is also cost effective for the hospital: although the Gannet is 400 Euro more expensive than the SHS (additional costs being 105 times 400 Euro = 42.000 Euro), unequivocally at least fifteen surgeries are waived, hence generating costs savings of 15 surgeries at 6.000 Euro (saving 15 times 6.000 Euro = 90.000 Euro). In a time of budget restraint, better results associated with fewer surgeries are very welcome.

<table>
<thead>
<tr>
<th>Femoral Neck fractures distribution</th>
<th>Patients</th>
<th>Treatment</th>
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<tbody>
<tr>
<td>Treatment of nondisplaced fractures (all pts)</td>
<td>125</td>
<td>IF</td>
</tr>
<tr>
<td>Displaced fractures, biological ‘young’ pts</td>
<td>105</td>
<td>IF</td>
</tr>
<tr>
<td>Displaced fractures, biological ‘old’ pts</td>
<td>270</td>
<td>HR</td>
</tr>
<tr>
<td>Total number</td>
<td>500</td>
<td></td>
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Figure 1. Normal distribution of nondisplaced & displaced fractures in 500 pts.
Directly in the beginning, the approach of developing a new device, specifically designed for femoral neck fractures, has been based on science. The biomechanical considerations and results were published in peer reviewed magazines: Injury, Int. J. Care Injured 40 (2009) 283-287.

Also, the first case series (25 patients) were published in peer reviewed magazines (Arch. Orthop. Trauma Surg. (2011) 131:519-524.

Currently, we are in the stage of finalizing the results of the treatment with the Gannet, with a follow up of at least one year, with close to 1,000 patients. The results of the first batch (149 patients with undisplaced femoral neck fractures) have been published in the European Journal of Trauma and Emergency Surgery http://gannetimplant.com/wp-content/uploads/2016/05/lowfailurerate.pdf. A new publication is under review: a publication with the results of more than 100 patients with displaced femoral neck fractures. (under review) and two publications in preparation for a new batch with 250 patients.

Eventually, some surgeons of Brussels who were in sympathy with the spirit of advance and change and had the ability to speak several European languages took over the task of founding The International Surgical Society (ISS)/Société Internationale de Chirurgie (SIC). The International Surgical Society (ISS)/Société Internationale de Chirurgie (SIC) is the first and oldest International Surgical Society in the world. One cannot help but be impressed with the names of the surgeons who were prominent members of the ISS over the years, and certainly in the earlier part of the last century there cannot have been any surgeon of note internationally who was not a member of the ISS. The drive to establish the Society at the end of the 19th century was the difficulty of international communication, in contrast to today where communication exists at the push of a button. Today the increased specialization in surgery means that there are few Societies in which the generality of surgery with its different specialist interests comes together every two years and provides an opportunity for its participants to learn about areas outside their own special interest.

The stimulus came principally from the Belgian surgeons Arthur Gallet, Charles Willems, Antoine Depage, Jules Lorthioir and Jean Verhoogen. Both, Depage and Verhoogen had served as the first secretaries of the Royal Society of Surgery of Belgium which was established in 1893. Therefore, we at Gannet, are proud that Belgium is the third country in which the Gannet has been actually introduced. These surgeons will do their own independent scientific research on the results obtained with the Gannet.
Hip fractures

Fracture type: Femoral neck fractures

- Displaced Garden III & IV
  - Biological 'young' patients
  - Biological 'old' patients

Fracture type: Extra-capsular fractures

- Vertical fracture
- Basocervical
- Stable trochanteric
- Unstable trochanteric

Fracture type: Subtrochanteric fractures

- AO/OTA type A1 and A2.1
- AO/OTA type A2.2, 2.3 and A3

Solutions
- Conservative
- Screws
- SHS
- Gannet

Reintervention rate
- 32%
- 25%
- 14%

Unintervened
- Garden I & II
- Garden I & II

Solutions
- Conservative
- Screws
- SHS
- Gannet

Reintervention rate
- 30%
- 14%
- 10%
- 4%