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# EXPERT OPINION ON PUBLISHED ARTICLES

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## Complications of growing rod treatment for early onset scoliosis

S Bess, BA Akbarnia, GH Thompson, PD Sponseller, SA Shah, H el Sebaie, O Boachie-Adjei, LI Karlin, S Canale, C Poe-Kochert, DL Skaggs  
*J Bone Joint Surg Am.* 2010 92A; 15: 2533-43

This article is a retrospective review of the complications of growing rod treatment of early onset scoliosis (as defined by Dickson: starting before the age of 5 years, regardless of aetiology). Records from the Growing Spine Study Group database of 140 patients with a minimum 2-year follow-up, who had a total of 897 operations between 1987 and 2005, were evaluated. Seventy-one patients received single and 69 double rod constructs implanted either in a subcutaneous or submuscular plane. The complications were divided into wound, implant, alignment and general surgical or medical problems.

Overall, 58% of patients had at least one complication. The risk of complications decreased by 13% for each year older the patient was at the time of the first operation, and increased by 24% for every additional operation performed. Not all complications needed immediate surgery; many problems could be delayed until the next planned operation.

Implant complications requiring unscheduled surgery occurred in 27% of single rod constructs compared to only 10% in patients with double rods.

Wound problems developed in 26% of patients with subcutaneous rods, and 10% in those with submuscular implants.

Subcutaneous dual rods had significantly higher rates of wound breakdown, prominent instrumentation and unplanned operations than submuscular dual rods.

The complication rate reported appears to be consistent with other work on this technique.

Early onset scoliosis is a problem because half of spinal growth takes place in the first five years of life; deformity or restricted growth may have a disproportionate effect on trunk development. Respiratory function is especially vulnerable due to under-development of the lungs, and restricted chest wall movement with poor ventilation. Added to this is the progression of deformity over the whole growth period of the child, which often ends in extreme deformity, so effective management of the condition is imperative.

The authors review the results of traditional serial casting for early onset scoliosis, pointing out that it is most successful if used before the age of 2 years in idiopathic curves; that it has limited value in congenital or neuromuscular curves; and that there is little information in the literature on the complications of the technique.

The present trend is towards surgical treatment for early onset scoliosis, especially in congenital or neuromuscular deformities and failure of conservative treatment. The alternatives are early correction and fusion (with shortening of the thoracic spine leading to early cardio-respiratory failure, poor function and cosmesis), or non-fusion techniques with growing rods to control deformity while allowing growth to continue. Submuscular placement avoids periosteal stripping except where the construct is fixed to the vertebrae, and does not cause inadvertent fusion of the instrumented spine, while still giving better soft tissue coverage. Use of implants in older children allows better fixation into stronger bone reducing the risk of implant failure. Limiting the number of lengthening procedures cuts the complication rate, so lengthening should only be performed as necessary and not at fixed 6-monthly intervals, especially when the growth rate slows after 5 years of age.

This work gives valuable guidelines on the increasingly popular use of growing rods. The complication rate is high, but can be reduced significantly by using dual rods in a submuscular position, delaying the initial surgery as long as possible, and limiting subsequent lengthening procedures.

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### Adverse reaction to metal debris following hip resurfacing

J Langton, TJ Joyce, SS Jameson, J Lord, M van Orsouw, JP Holland, AVF Nargol, KA de Smet.  
*J Bone Joint Surg (Br)* 2011; **93-B**: 164-71

The authors analysed a large series (4 226 hips) of metal-on-metal hip resurfacing replacements over a one to 11-year follow-up period, using three implants.

1. Articular surface replacement
2. Birmingham hip resurfacing
3. Conserve plus

They found 58 failures associated with an adverse response to metal debris (ARMD), and also measured volumetric wear of the retrieved plants. There was a much higher failure rate among the articular surface replacement group than the other two implants. This again underlines the importance of analysing each individual prosthesis available for implantation, and comparing the results not only of the surgeon, but also of the implant. In this trial the surgeons were comparable with their implantation technique, and the majority of the failures were due to the prosthesis design.

There was a definite trend to increased failure with a smaller femoral head size as well, which has also been reported by the Australian Hip Register.

Volumetric wear correlated well with increased cobalt and chrome levels. The median cobalt and chrome levels were significantly higher in the failed group associated with ARMD. The extent of tissue destruction at revision however did not seem to be dose-related to volumetric wear and to metal ion levels. As yet there is still no clear indication as to whether ARMD is a metal ion concentration related event, or due to metal ion sensitivity. Evidence seems to be appearing that there is a correlation between adverse reactions and higher cobalt and chrome metal ion levels.

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### Induced membranes – a staged technique of bone-grafting for segmental bone loss: Surgical technique

Keen-Wai Chong, Colin Yi-Loong Woon, Merng-Koon Wong  
*JBJS (Am)* 2011; **93** Suppl 1: 85-91

The management of segmental bone defects, especially in the tibia, can be challenging. In this surgical technique description the authors describe a very promising technique in the management of these difficult problems.

They describe the introduction of an antibiotic-laden bone cement spacer in a previously infected tibial diaphyseal defect. This induces formation of a membrane (pseudo-periosteum) around the spacer and, after removal, autogenous bone graft is introduced into the cavity.

They utilise unreamed tibial nailing at the time of spacer insertion as the fixation technique and demonstrate consolidation of this tibial defect without further intervention.

The technique is based on research by Masquelet, who has established that induced membranes can act as periosteum and extend the viable length of autogenous bone grafting.

The technique described by the authors is utilised in my practice both for infected non-unions as well as acute defects to induce a pseudoperiosteal sleeve into which we either transport bone segments or perform fibular transfers. My personal experience with autogenous grafting into these membranes is limited and relatively unsatisfactory, due to the length of consolidation time of the new graft. The authors describe fixation with unreamed nailing whereas my patients tend to be in external fixators. The nails are tolerated better over the long term, but my concern would be in terms of potential implant-related infection.

Membrane induction in the management of segmental bone defects (acute or chronic) is becoming more and more common in the field of limb reconstruction surgery and is certainly a technique worth learning for those involved in managing these difficult cases.