Use of Magnetically Controlled Growing Rods in Treatment of Early Onset Scoliosis

Introduction

Early Onset Scoliosis (EOS) is defined as scoliosis occurring at an early age of less than 10 years. The causes of EOS are variable including congenital and syndromic scoliosis. The long-term prognosis of these patients is poor with increased risk of early death.

Indication

The indication for operative treatment in these cases depends on the severity and also response to conservative treatment.

Commonly these patients undergo surgery when the Cobb angle is severe and deteriorating. These are usually complex cases with high risk of organ disorders. The complication rate of surgery is also high. Conventional surgery involves the use of a growing rod device that must be manually lengthened with an operation done under general anaesthesia (GA) every 6-12 months. However, this means that the patient requires repeated operations under general anaesthesia with increased surgical complications including wound infection.

The use of the Magnetically Controlled Growing Rod (MCGR) reduces number of operations as the fixation rods could be lengthened by an external magnetic coil after the index operation. The magnetic coil drives a motorized device to allow a telescopic rod to be lengthened without the need for multiple operations. Currently the MCGR can lengthen to a maximum 4.8 cm. There is a minimal length of the spine before one could use this device which is around 22 cm.

It is important to note that although the total number of operations in MCGRs is comparably lower than conventional growing rods, repeated surgery is still expected in MCGRs. These may include planned exchange of rods if the lengthening device is used up or for dealing with complications.

The Procedure

The surgical details of each case vary depending on the nature of the scoliosis. Currently the most effective method is to implant the rod in the sub-fascial plane. The MCGRs are usually implanted to fixation screws (or other fixation methods) placed at each end of a scoliosis curve.

A special external electro-magnetic coil with function to control the amount of rod lengthening is placed over the previously marked site on the skin. The motor is activated to effect the preset amount of lengthening. The typical rate of lengthening is 2 mm per month with an expected total of 24 mm in one year. Your doctor may schedule a higher rate or degree of lengthening or more frequent visits according to the patient's specific condition.

Antibiotic prophylaxis is used for wound infection prevention. Transfusion may be required.

Risk and Complication

Anaesthetic

Same risk as other patients undergoing general anaesthesia.

General

Wound infection risk is low.

Specific

Failure of distraction can occur due to implant failure and premature fusion. Loss of curve control and continued curve progression can occur. When this happens, the doctor will reassess the situation and may need to revise the treatment strategy to deal with each specific complication. These strategies may include removal of all implants, debridement and clearing the wound of infection, skeletal traction treatment and spinal osteotomy with definitive instrumented fusion of the spine.

Before the Procedure

After admission procedure, the doctor will instruct the patient to lie in a prone position over a pillow on the examination bed. The back is exposed so that the MCGR's magnetic motor can be localized with a hand held magnetic detector. The doctor will then mark the location of the magnet on the skin.

After the Procedure

After initial hospitalization for wound healing, the treating doctor will take post-operative x-rays to check implant position and initial length of the rods. Patients are discharged home when well. A schedule is set for patients to return to hospital at weekly or monthly intervals for lengthening of the implanted rods.

Alternative Treatment

The MCGR may not be the best treatment option for every EOS patient. Relatives should discuss with the attending doctor regarding the pros and cons of all applicable treatment options. Alternative treatment would be conservative or brace treatment which may lead to continued progression of the deformity and the associated complications. This is expected for EOS patients. The use of conventional growing rods is an alternative surgical option that requires multiple operations under GA.

Follow Up

Regular 3-6 months interval x-rays or real time Ultra-sound scan examinations are used to monitor the rate of distraction of the rod. The efficacy of lengthening by MCGR may be lost as time goes by.

When the whole distraction length has been used, revision surgery may be required if further treatment is intended till definitive fusion. The end point of treatment is definitive fusion surgery close to skeletal maturity which is usually beyond age 12.

Remarks

This is general information only and the list of complications is not exhaustive. Other unforeseen complications may occasionally occur.

The actual risks may be different for different patients. During the operation, unpredictable condition may arise, and additional procedures may be performed if necessary. For further information, please contact your doctor.