

IDIOPATHIC SCOLIOSIS - TREATMENT BY PRE-OPERATIVE RISSER'S LOCALISER CAST FOLLOWED BY HARRINGTON RODDING AND POSTERIOR SPINAL FUSION

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SYNOPSIS

Thirty-eight cases of idiopathic scoliosis from the Department of Orthopaedic Surgery, Singapore General Hospital were operated from 1979 to 1984. The age range varied from 11-19 years. All were treated pre-operatively by Risser's localiser cast with a follow-up period which ranged from 1 to 6 years. The localiser casts gave a curve correction of approximately 25% while the Harrington Rod and posterior spinal fusion gave an additional correction of 25 to 30%. After 1 year of follow-up, the loss of correction in the curvature was about 10%. Another 5% loss of curvature was noted in the second year of follow-up. No major post-operative complications were encountered either with the cast or Harrington Rodding and posterior spinal fusion technique. The blood loss in the operation varied from 1 litre to 2.5 litres.

SING MED J. 1988; 29:219-221

INTRODUCTION

In the 1960's, the Harrington instrumentation was developed for the surgical management of scoliosis. Since then the instrument has been successfully used and tested. The general conclusion was that a gratifying correction of scoliosis could be attained with the instrument. However, a supplementary bone fusion was mandatory to maintain the initial correction. In order to achieve reasonable results, a trained surgical team is required and post-operative treatment should be carefully monitored. Before the introduction of the Harrington instrumentation, Goldstein had used the pre-operation localiser cast in the correction of idiopathic scoliosis, followed by post-operative spinal fusion. With the advent of the Harrington instrumentation, the latter was incorporated to supplement the treatment of scoliosis. All these procedures were deemed necessary to avoid the dreaded complication of acute paraplegia following surgery. In this study, 38 patients from the Department of Orthopaedic Surgery, Singapore General Hospital, were operated by the methods advocated by Goldstein and Harrington, namely using the Harrington instrumentation and posterior spinal fusion, and the results of the operations were critically assessed.

MATERIALS AND METHODS

Thirty-eight patients from the Department of Orthopaedic Surgery, Singapore General Hospital were operated from 1979 to 1984. 89.5% of the patients were females with ages varying from 11-19 years. They were followed up for periods of 1 to 6 years. The angular deformity of curve prior to correction as measured by the Cobb method was between 40 and 110 degrees.

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Pre-operative Evaluation

Our routine pre-operative workup included a comprehensive blood count, urine analysis, Electrocardiogram (ECG), chest x-ray, pulmonary function test, coagulation profile (including bleeding time) and arterial blood gases. In patients with congenital heart disease, the cardiovascular system must be evaluated by a cardiologist. In the operating room, a route for intra-venous therapy was established and monitoring of blood pressure, ECG and precordial heart and lung sounds were started before anaesthesia was induced.

Surgical Fusion Technique

The technique of surgical fusion employed was followed in detail as described by Goldstein and Moes(1 - 7). Basically the objective was to create as broad a bleeding base as possible by wide deep decortication of the posterior elements after meticulous removal of all soft tissue. A meticulous sub-periosteal resection was made by a straight mid-line posterior incision exposing the transverse process, the joints and the laminae. Complete removal of all soft tissue over the bone structures was important. The process included decortication of the laminae of the vertebrae, and resection and block fusion of the facet joints as that described by Moe(14 - 17). The Harrington distraction instrumentation was inserted after decortication was completed so as not to interfere with the thoroughness of decortication. A large amount of fresh autogenous cancellous and cortical iliac bone graft was used to supplement the fusion in all patients. Blood loss was determined accurately and replaced as it occurred. We routinely used the intraoperative awakening test in patients undergoing surgery involving distraction of the spinal column using the Harrington distraction instrumentation. The patient was informed about the procedure to minimise the possible psychological trauma in patients who accidentally woke up during the operation. They were told when the Harrington rod was in place and would be awakened momentarily and asked to move their hands and feet. They were subsequently reanaesthetised after the test. They were also informed that most probably they would not remember the event and if they did, they would not feel pain. Routinely, hypotensive anaesthesia was used to minimise blood loss. An average of 2 litres of

minimise blood loss. An average of 2 litres of blood was given in the operating room (average of 1-3 litres). The overall operative time was 4 hours.

Post-operative treatment

All patients were immobilised post-operatively in a well moulded localiser cast for a period of 3 months, followed by either a Milwaukee brace or thoraco-lumbar-sacro-orthosis for a period of 1-2 years, depending on the curvature and age of the patient.

RESULTS AND DISCUSSION

Of the 38 cases observed, 27 were presented with a thoracic curve pattern, 9 with a thoraco-lumbar curve pattern and 2 with a lumbar curve pattern (Table II). The curvatures were measured by the Cobb's method and found to vary between 40° to 110°, with the majority at 40° to 60°. The curvatures were subdivided into 3 categories: those between 40° to 60°, 60° to 80° and those above 80°. The corrections attained by the operative procedures in each category are presented in Table III. We encountered a very low rate of pseudo-arthrosis in our studies, possibly because of the meticulous fusion technique employed, the use of large amounts of orthogenous bone graft and a well mould post-operative localiser cast.

COMPLICATIONS

One case of respiratory distress following Harrington Rodding and spinal fusion was observed. The cast had to be bi-valved and reapplied on the 16th post-operative day. There was one case of a broken rod and another involving the development of hepatitis after operation. Other than these complications, the other cases were uneventful.

CONCLUSION

The Harrington Distraction Instrumentation has been found to be a useful adjunct in the treatment of idiopathic scoliosis. It serves as a major or supplementary device for correction of the curve and as a form of temporary internal fixation. The spinal fusion technique maintains correction of a curve only if the fusion mass is of proper length and of sufficient strength to withstand the stresses imposed when the erect posture is resumed and all external immobilisation is discontinued. The low rate of pseudoarthrosis and the maintenance of a high percentage of the initial correction in this series of thirty-eight patients appears to be due to a meticulous fusion technique supplemented by Harrington distraction instrumentation, the use of large amount of fresh autogenous iliac bone graft and adequate external immobilisation.

**TABLE 1
SEX DISTRIBUTION**

Female	:	34
Male	:	4

TABLE 2

Curve pattern	
Thoracic	27
Thoraco-lumbar	9
Lumbar	2

**TABLE 3
CORRECTION BY RISSER CAST, HARRINGTON ROD, FUSION COBB MEASUREMENT**

No of Cases	Av Original Curve	Correction In Cast	Harrington Rod Fusion	1 Year Follow Up	2 Year Follow Up
27	40° — 60° Average 35°	40°	27°	30°	32°
7	60° — 80°	51°	35°	38°	39°
4	> — 80°	60°	40°	42°	42°

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