

POLIOMYELITIS SCOLIOSIS: THE RESULTS OF SURGICAL TREATMENT

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14 patients with the diagnosis of poliomyelitis scoliosis (9 female 5 male) were operated in the Department of Orthopaedics and Traumatology, Faculty of Medicine University of Çukurova Adana, Turkey, between March 1989 and November 1993. The mean age of the patients was 16.77 (range between 7-60 years). Eight of the 14 patients had combined fusions and the remaining 6 patients had posterior fusions. The surgical methods were as follows: Luque-Galvestone (with Isola instrumentation) combined with anterior fusion in 5 patients and one Luque-Galvestone without anterior fusion. Luque posterior instrumentation in 3 patients. Hartshill posterior instrumentation in 3 patients. Hartshill posterior instrumentation (2 combined with anterior fusion) in patients and Harrington posterior instrumentation in 2 patients. Cobb angles of the scoliotic curves were measured preoperatively in traction and postoperatively. The mean preoperative magnitude of the curves was 90.57 degrees which improved to 58 degrees (36% correction) in traction and improved to 44.6 degrees (51% correction) postoperatively. The mean preoperative decompensation of the torso was 18.6 cm which improved to 10.6 cm (44% correction) and pelvic tilt improved from a mean value of 24.3 degrees to 12.5 degrees (51% correction). The mean follow-up period was 18.9 months. The main complications were as follows: Rod breakage and curve progression in one case, urinary incontinence in one case and curve progression in two cases.

Key Words: Paralytic scoliosis, surgical treatment.

INTRODUCTION

Scoliosis secondary to neuromuscular disease is probably the oldest form of recognizable spinal deformity. With the control of polio by early immunization, less attention is directed to this type of deformity but it is still a problem especially in some parts of our country. Polio with extensive paralysis or asymmetrical weakness generally causes a collapsing spine which gives rise to a long C curve. With certain notable exceptions the long curve to the sacrum is the hallmark of neuromuscular deformities and pelvic obliquity frequently accompanies in these patients. Non-ambulatory polio patients with intact sensation can develop pain and decreased sitting tolerance owing to a pelvic obliquity. Surgery for patients with neuromuscular deformity aims to obtain a stable, compensated spine with the torso balanced over a level pelvis. To accomplish these goals in a nonambulatory patient with a fixed pelvic obliquity most authors declare that the instrumentation should be extended into the pelvis.

In this study we would like to present the results of the surgical treatment of the scoliosis secondary to poliomyelitis.

MATERIALS AND METHODS

The clinical reports and roentgenograms of the 14 patients that were surgically treated for poliomyelitis scoliosis between March 1989-November 1993 were retrospectively evaluated.

The study group included 5 male and 9 female patients, with an average age of 16.77 years (range 7-60 years).

All the patients were operated by the same surgical team. The surgical methods were as follows: Luque-Galvestone (with Isola instrumentation) combined with anterior fusion in 5 patients and Luque-Galvestone posterior instrumentation without instrumentation in one patient. Luque posterior instrumentation in 3 patients. Hartshill posterior instrumentation (2 combined with anterior fusion) in 3 patients and Harrington posterior instrumentation in 2 patients (Table 1). Scoliosis was measured using the Cobb method. All patients had C-type collapsing curves. The preoperative scoliosis averaged between 90.57 degrees (range 50-135). (Table 2).

Pelvic obliquity was determined by measuring the angle between the line joining the superior aspects of the iliac crests and horizontal line. The average preoperative pelvic obliquity angle was 24.3 degrees (range 3-54) (Table 2).

Decompensation of the torso was measured as follows: we joined the superior aspects of the iliac crests and from the midpoint of this line we draw another line in right angle. On this second line we found the point that intersects with another line that is in right angle with T1-S1 line on T1 point. The distance between this point and T1 point was accepted as the decompensation of the torso (4). The average preoperative decompensation was 18.6 cm (range 1.8-43) (Table 2).

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Table 1.

	Age	Sex	Surgical Technique	Fused Vertebrae	Preop.-Status	Complications
1	13	F	Galvestone+AF	T11-S1	Non-ambulatuar	-
2	17	M	Galvestone+AF	T9-S1	Non-ambulatuar	Urinary incontinance
3	13	F	Galvestone+AF	T2-S1	Ambulatuar	-
4	13	F	Galvestone+AF	T6-S1	Amb. with cruthes	-
5	60	M	Galvestone+AF	T4-S1	Paraplegia	-
6	15	F	Galvestone	T10-S1	Non-ambulatuar	-
7	15	F	HRSF	T8-L5	Ambulatuar	-
8	7	F	Hartshill	T4-L4	Ambulatuar	Curve Progression
9	10	M	Luque	T3-L5	Non-ambulatuar	-
10	13	M	Luque	T1-S1	Amb. with cruthes	Rod Breakage
11	11	F	Luque	T4-L2	Amb. with orthoses	-
12	17	F	Hartshill+AF	T6-L5	Amb. with orthoses	Infection
13	14	M	Hartshill+AF	T5-L4	Ambulatuar	Curve Progression
14	16	F	HRSF	T5-S1	Ambulatuar	Curve Progression

Table 2.

	Scoliotic Curve (Cobb Method)			Pelvic Obliquity		Decompensation of the torso	
	Preoperative	Traction	Postoperative	Preoperative	Postoperative	Preoperative	Postoperative
1	135	80	60	54°	24°	43 cm	20 cm
2	110	80	60	34°	18°	21 cm	13.6 cm
3	85	40	33	25°	6°	24 cm	4 cm
4	91	56	46	25°	12°	23 cm	24 cm
5	50	29	26	22°	12°	22.5 cm	8.8 cm
6	110	70	56	37°	20°	34 cm	15.7 cm
7	87	67	40	30°	9°	3.4 cm	2.8 cm
8	60	32	24	18°	8°	6 cm	6.7 cm
9	90	55	27	27°	6°	20 cm	7.5 cm
10	90	50	46	40°	8°	32 cm	6.2 cm
11	66	49	42	8°	12°	1.8 cm	8.5 cm
12	92	58	55	7°	0°	2.3 cm	1.8 cm
13	100	81	40	8°	12°	4.3 cm	7.8 cm
14	102	80	72	32°	32°	23 cm	18 cm

RESULTS

In 8 of 14 patients anterior discectomy with autologous rib bone grafting of the intervertebral spaces preceded posterior instrumentation. With an average of 10 days later posterior instrumentation. With an av-

erage of 10 days later posterior instrumentation was performed. An average of 7 discs were removed (range 4-9) depending on the extend and rigidity of the spine. In case number 13 the curve was so rigid that though we performed an apical corpectomy and

could manage to improve the curve from 100 to 40 degrees in the early postoperative period, the curve tended to progress in a few months.

The blood loss of anterior surgery could be replaced by an average of 1 unit of homologous blood. But posterior instrumentation following anterior procedure in which the average surgical time was 3.5 hours we used a cell saver machine the need of homologous blood transfusion was decreased from an average of 3 units to 1 unit.

The average correction of the scoliosis was 51%. The mean preoperative magnitude of the curves was 90.57 degrees which improved to 58 degrees (36% correction) in traction and improved to 44.6 degrees (51% correction) postoperatively. The average correction of the pelvic obliquity was 51% with the improvement of 24.3 degrees to 12.5 degrees of mean values. The correction of the decompensation of the torso was 44%. The average preoperative decompensation of the torso was 18.6 cm. which improved to 10.6 cm. postoperatively. The mean follow-up period was 18.9 months.

There were five complications in the study group. We observed two curve progression (cases no. 7 and 13), one rod breakage and curve progression (case no. 9), one urinary incontinance (case no. 2) and one infection which was treated with antibiotics (case no. 12). Figure one and two demonstrates an example for our study.

DISCUSSION

Conservative treatment with brace for paralytic scoliosis need some modifications because of the

probable skin breakdown problems. However most of the authors state that any orthosis used in the paralytic patients functions as a passive device (6, 10, 15).

Luque rod segmental instrumentation is particularly valuable for patients with neuromuscular scoliosis. When correcting these spinal curvatures it is important to consider pelvic obliquity. Problems with sitting balance, sitting tolerance and pressure necrosis on the down side of the gluteal region can result from pelvic obliquity (20) and a variety of techniques have been recommended to improve this deformity (5, 11, 13, 17, 21, 22, 23, 24).

Allen and Ferguson developed a method of pelvic fixation that has become known as the Galvestone technique (2). They performed anterior spinal release followed by a second-stage posterior spinal instrumentation using two separate L-rods. In between two procedures 10-14 days of traction period was used.

The average correction of pelvic obliquity was 67% and correction of scoliosis was 64%. Some authors used anterior instrumentation (7, 8, 12, 14, 17, 18) but Ferguson and Allen stated that anterior discectomy and bone grafting alone without instrumentation would provide adequate correction and fusion when combined with segmental posterior spinal instrumentation (11) (Table 3). Eberle stated that segmenter spinal instrumentation without posterior fusion failed to prevent recurrences (9). Maloney et al were able to correct the scoliosis by an average of 81% and pelvic obliquity by 82% using a unit rod rather than two separate L rods (16). The benefits of unit rod segmental instrumentation was also advocated by Bell and co-workers (3). In our study group scoliosis correction

Table 3.

Reference	Anterior Procedure	Posterior procedure	Preoperative traction	Correction pelvic obliquity (%)	Correction of Spinal curve
Bonnett et al (5)	None	Harrington+fusion	Yes	53	Curve>100 39% Curve 60-100° 51%
Taddonio (23)	None	Luque rod+fusion	No	57	Curve<60° 65%
O'brien et al (20)	Dwyer+fusion	Harrington+fusion	Yes	79	52%
Swank et al (22)	Zielke+fusion	Harrington+fusion	No	74	Not available
	Dwyer+fusion	Harrington+fusion	No	75	77%
McMaster (18)	Dwyer+fusion	Harrington+fusion	No	81	60%
Floman et al (12)	Dwyer+fusion	Harrington+fusion	No	73	63%
Mayer et al (17)	Dwyer+fusion	Harrington+fusion	Yes	68	Upper, 49%, Lower 61%
Ferguson-Mi...	Release+fusion	Luque rod+fusion	Yes	67	64%
Neustad et al (19)	None	CD to pelvis		50	38-70

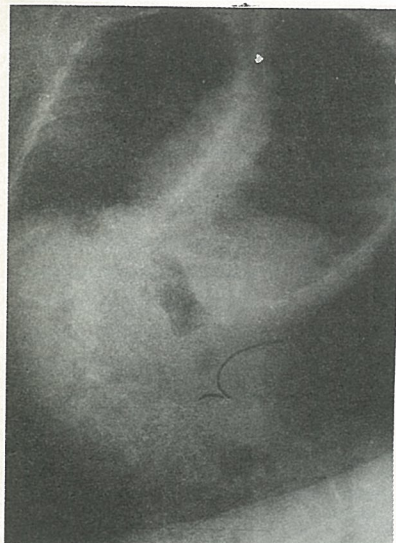


Fig. 1. 13 years old female preoperative X-ray.

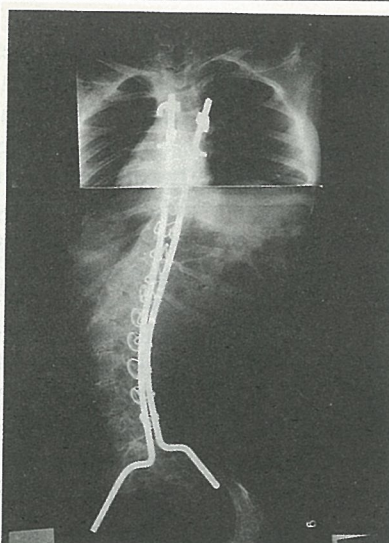


Fig. 2. X-ray of the same patient after anterior release and posterior Luque-Galvestone operation.

was 51% and pelvic obliquity improvement was 51%. Acaroğlu et al in a study of 20 patients with scoliosis secondary to poliomyelitis, declared that anterior and posterior combined surgery and segmental instrumentation techniques are necessary for rigid, paralytic scoliosis and added that; for especially ambulatory patients there is a risk for progression in the decompensation when pelvic fixation was included in the procedure (1). In our study group Galvestone technique was performed for six patients but four of them were unable to walk the results of these patients according to decompensation of the torso showed improvement whereas in one of the remaining two mobile patients we observed regression in the decompensation measurement.

For paralytic scoliosis, anterior and posterior combined fusion is the choice of treatment. Anterior release without instrumentation is generally sufficient.

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