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THROMBOEMBOLIC COMPLICATIONS FOLLOWING SCOLIOSIS SURGERY IN SCANDINAVIA

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Out of 1229 patients operated on according to Harrington there were eight with clinical deep venous thrombosis (DVT) confirmed by phlebography or at autopsy. One patient died from massive pulmonary embolism. All eight DVT were located proximally on the left side. In two cases the first symptom was abdominal pain. At follow-up two patients had slight complaints. One had edema in hot weather and one swelling of the left leg. Another patient had no complaints but venography showed pathological collateral veins. There may be a considerable risk of development of a post-thrombotic syndrome.

Key words: scoliosis; thrombosis; iliac compression syndrome

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Thromboembolic complications following scoliosis operations have been considered to be extremely rare. To gather experience, a multicentre investigation was proposed at a meeting of the Scandinavian Society for Scoliosis Research in Gothenburg in 1976.

MATERIAL AND METHODS

This retrospective study is based on reports from scoliosis centres in Denmark, Finland, Norway and Sweden. In all 1229 patients were operated on according to Harrington in 1963–1976. Postoperatively 3–5 weeks of strict bedrest was prescribed. Some of the patients were operated on on two occasions. The diagnosis of deep venous thrombosis (DVT) was based on clinical examination and verified by contrast phlebography or autopsy. In Malmö, isotope phlebography was carried out simultaneously.

The material is presented in Table 1. The mean values of estimated blood loss and duration of operation were calculated for each centre and are used for comparison between patients with and without DVT.

RESULTS

DVT was diagnosed in eight cases (Table 1) which implies an incidence of 6.5 per thousand. Patients with DVT were significantly older than the average ($P < 0.001$, t-test) (Tables 1 and 2). The operation was in these cases more extensive than average as indicated by the number of vertebrae fused, the duration of the operation ($0.05 < P < 0.10$, t-test) and the estimated blood loss ($P < 0.05$, t-test) (Tables 1 and 2).

The DVT were in all cases localized proximally on the left side. The diagnosis was made at about 3 weeks after operation (Table 3). The symptoms were negligible in

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Table 1. Scoliosis operations according to Harrington and incidence of deep venous thrombosis (DVT)

Hospital	No. of operations	No. of DVT	Mean values: Age (years)	Mean values: Blood loss (liters)	Mean values: Duration of operation (minutes)
HSS	22	0	18	2.5	240
KSS	95	1	15.5	2.5	210
SSG	389	4	15.8	2.9	155
MAS	84	2	17.5	1.6	210
ISH	400	1	14.5	1.3	120
OHK	115	0	14	1.0	210
SMO	124	0	?	?	?
Total	1229	8			

HSS = Department of Orthopedic Surgery, Huddinge Hospital, Stockholm, Sweden
KSS = Department of Orthopedic Surgery, Karolinska Hospital, Stockholm, Sweden
SSG = Department of Orthopedic Surgery I, Sahlgren Hospital, Gothenburg, Sweden
MAS = Department of Orthopedic Surgery, Malmö General Hospital, Malmö, Sweden
ISH = Orthopedic Hospital of the Invalid Foundation, Helsinki, Finland
OHK = Orthopedic Hospital, Copenhagen, Denmark
SMO = Sophics Minde Orthopedic Hospital, Oslo, Norway

two patients and the patient who died because of massive pulmonary embolism had no symptoms until immediately before death. Five out of eight patients had a slight increase in temperature (about 38° C) 1–2 days before diagnosis and one patient was running a slight fever for 18 days before the diagnosis was made. Two had a normal temperature on the day before the diagnosis. Five patients had an increased pulse rate; in one case the pulse was not recorded. Most of the patients had local symptoms (Table 3) which were investigated by phlebography. Two patients had abdominal pain as their first symptom causing suspicion of an abdominal condition.

The initial treatment was Heparin in six cases and Streptokinase in one. Later six were treated with Dicumarol for a few months (Table 4). At follow-up two patients had a post-thrombotic syndrome 1 and 2 years after surgery, respectively. One showed

Table 2. Patients with DVT

Hospital	Sex	Age (years)	No. of vertebrae fused	Duration of operation (minutes)	Blood loss in liters: perop.	Blood loss in liters: postop.
SSG	F	28	10	170	1.1	1.7
SSG	F	28	10	195	2.3	2.2
SSG	M	21	12	220	1.9	2.9
SSG	F	15	10	120	1.2	1.2
KSS	F	23	10	300	5.2	1.0
ISH	F	15	7	150	0.7	1.0
MAS	F	18	13	240	1.1	1.3
MAS	F	24	11	250	0.8	1.2

Table 3. DVT in eight patients operated on according to Harrington

Localization of DVT	Side	Diagnosis Days after op.	Pain/	Days after op.	Edema/	Days after op.	Other symptoms
V. femoralis V. saph. magna	L	21	thigh + lower leg	18	whole leg	19	cyanosis of the left leg
V. iliaca comm. (old?) crural veins	L	18	lower leg	16	none		none
V. femoralis	L	21	?		none		none
V. iliaca comm. V. femoralis	L	21	thigh	20	whole leg	20	abdominal pain
V. femoralis Pulm. emboli	L	12	inguinal region	12	none		sudden death
V. iliaca comm.	L	34 after discharge	none		whole leg	34	none
V. iliaca comm. V. femoralis	L	20	inguinal region	18	none		none
V. iliaca comm. V. femoralis	L	28	hip + thigh	26	none		abdominal pain anxiety

abnormal collateral flow at the 1-year follow-up, demonstrated by isotope phlebography, but was without symptoms.

DISCUSSION

The true incidence of DVT following scoliosis surgery is probably higher than our apparent 6.5 per thousand. We have recorded the clinically diagnosed DVT only and thrombosis often gives no symptoms (Kakkar et al. 1969). As expected, patients with thrombosis were older than the average.

All DVT were located proximally on the left side. One reason for this may be that the left iliac vein is more vulnerable because of its anatomical relationships, as described by Cockett & Lea Thomas (1965)—the iliac compression syndrome. During the operation

Table 4. Treatment of eight patients with DVT

Treatment		Days	Follow-up (months)	Symptoms and signs
Streptokinase	Dicumarol	180	9	none
Heparin	Dicumarol	180	6	none
Heparin	Dicumarol	180	11	none
Heparin + Dextran	Dicumarol	?	24	slight edema in hot weather
Heparin	Dicumarol	90	12	left femur + 2 cm left lower leg + 1 cm
Heparin	Dicumarol	180	12	isotope venography shows abnormal collateral flow in the pelvic region
Heparin		8	18	none

the patients are placed on a modified Realton frame which generates continuous pressure on the inguinal region, possibly reducing the blood flow.

Most patients developed symptoms 3 weeks after surgery. The long delay may be explained by the strict bedrest, reducing the demands and allowing the thrombus to attain a considerable size before causing symptoms. During that time there may be a risk of pulmonary emboli and most pulmonary emboli occur without previous clinical symptoms (Sevitt 1962).

The risk of post-thrombotic syndrome is high in cases with proximal involvement (Cockett et al. 1967). Out of our seven patients so far only two have developed a post-thrombotic syndrome but the incidence will, most likely, increase with time (Gjöres 1956). The scoliosis patients without clinical signs of thrombosis may also develop a post-thrombotic syndrome since such symptoms are preceded by an episode of clinically apparent thrombosis in only one third of the cases (Antal & Reiss 1976).

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