

Late results of iliofemoral venous thrombectomy

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Purpose: Although anticoagulation therapy for iliofemoral venous thrombosis prevents pulmonary embolism, it is not designed to avoid the postthrombotic syndrome. Mechanical removal of the thrombus in the form of venous thrombectomy should yield better long-term results. The purpose of our study was to analyze the clinical outcome and venous valvular function of limbs 5 to 13 years after iliofemoral venous thrombectomy.

Methods: Seventy-seven lower extremities underwent venous thrombectomy for acute iliofemoral venous thrombosis and were monitored for a mean follow-up of 8½ years (range, 5 to 13 years). Patency of the iliofemoral venous system, competence of the femoral popliteal valves, and clinical signs and symptoms of chronic venous insufficiency were evaluated in each case.

Results: Subsequent to early perioperative failure, patency remained stable over time at 84%. Valvular competence was preserved in 80% at 5 years; however, it decreased to 56% at 10 years. It is important that more than 90% of the limbs had no symptoms or mild symptoms of chronic venous insufficiency.

Conclusions: Venous thrombectomy should be considered for primary treatment in selected cases of early iliofemoral venous thrombosis. (*J Vasc Surg* 1997;25:417-22.)

Venous thrombectomy is not a widely accepted operative procedure for the treatment of acute iliofemoral venous thrombosis because of a high rate of rethrombosis and complications, which was reported in the 1960s.¹ However, the technique of venous thrombectomy has been refined and has now evolved to a procedure with much less morbidity and a significantly better chance of success if coupled with appropriate patient selection.²⁻⁴ Few studies are available that provide long-term follow-up⁵⁻⁸; therefore the role of venous thrombectomy in preventing the development of the postthrombotic syndrome remains in question.

Postthrombotic syndrome occurs in 60% to 70% of cases when these patients are monitored between

5 and 10 years after conservative treatment of deep vein thrombosis.⁹⁻¹⁰ Our objective was to evaluate the late patency, valvular competence, and clinical outcome after venous thrombectomy in patients monitored for more than 5 years.

MATERIAL

Seventy-seven iliofemoral venous thrombectomies (two bilateral) were performed on 75 patients before October 1988. Twenty-nine (39%) men and 46 (61%) women with a mean age of 51 years (range, 16 to 76) were studied. The left limb was more frequently involved than the right (50 [65%] vs 27 [35%]). Among 50 left iliofemoral venous thrombectomies, 31 stenoses by anatomic compression located at the ilioacaval junction were encountered. Nine (eight women, one man) were tight, and 22 were moderate. Thrombectomy was performed 1 to 16 days (mean, 6.2 days) after the estimated onset of the thrombosis. The diagnosis and extent of venous thrombosis were established by bilateral ascending phlebography and, when necessary, ilioacavography. The thrombosis was limited to the iliofemoral segment in only five cases (6%) and extended to other venous segments in the remaining 72 limbs: infe-

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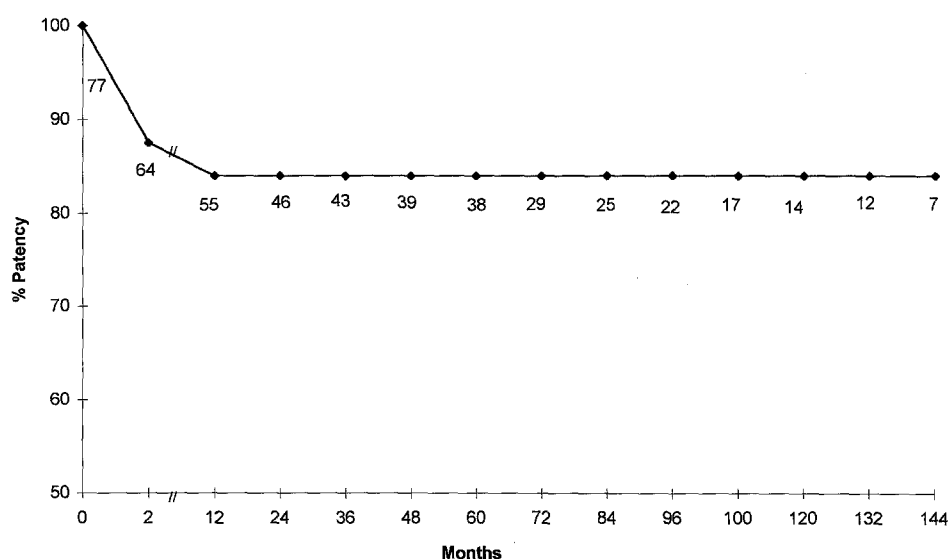


Fig. 1. Cumulative iliofemoral vein patency after thrombectomy.

Table I. Cumulative iliofemoral vein patency after thrombectomy

Interval (mo)	No. limbs at risk	No. failure	Duration of follow-up ends	Lost to follow-up	Death	Cumulative patency (%)	SEM (%)
0-2	77	10	0	2	1	100	0
2-12	64	2	0	5	2	87	3.9
12-24	55	0	0	6	1	84	4.5
24-36	48	0	0	5	0	84	4.8
36-48	43	0	0	3	1	84	5.1
48-60	39	0	0	1	0	84	5.4
60-72	38	0	4	3	2	84	5.6
72-84	29	0	4	0	0	84	6.2
84-96	25	0	3	0	0	84	6.7
96-108	22	0	5	0	0	84	7.2
108-120	17	0	3	0	0	84	8.1
120-132	14	0	1	1	0	84	9
132-144	12	0	5	0	0	84	9.7
144-156	7	0	0	0	0	84	12.7

rior vena cava 26 (34%), femoral popliteal veins 64 (83%), and calf veins 41 (54%). Two levels of thrombosis occurred in 27 (35%) limbs, three levels in 31 (41%) limbs, and four levels in 14 (18%) limbs. Venous thrombectomy was performed with the patients under general anesthesia through a common femoral venotomy with a balloon catheter. Vollmar rings and suction maneuvers were used for the iliofemoral venous system, and external compression maneuvers were used for calf and femoral popliteal veins.^{11,12} The inferior vena cava was controlled through a subcostal transperitoneal access and a vena caval thrombectomy, performed when necessary.

An arterial venous fistula was constructed on the common femoral vein and was ligated 6 to 8 weeks later. Patients received oral anticoagulation for a minimum of 6 months and were asked to wear elastic compression stockings for at least 1 year after surgery.

METHODS

Early results were assessed by clinical examination and venous phase arteriograms after 8 days and by ascending phlebography and venous duplex examinations after 2 months, when the arteriovenous fistula was closed.

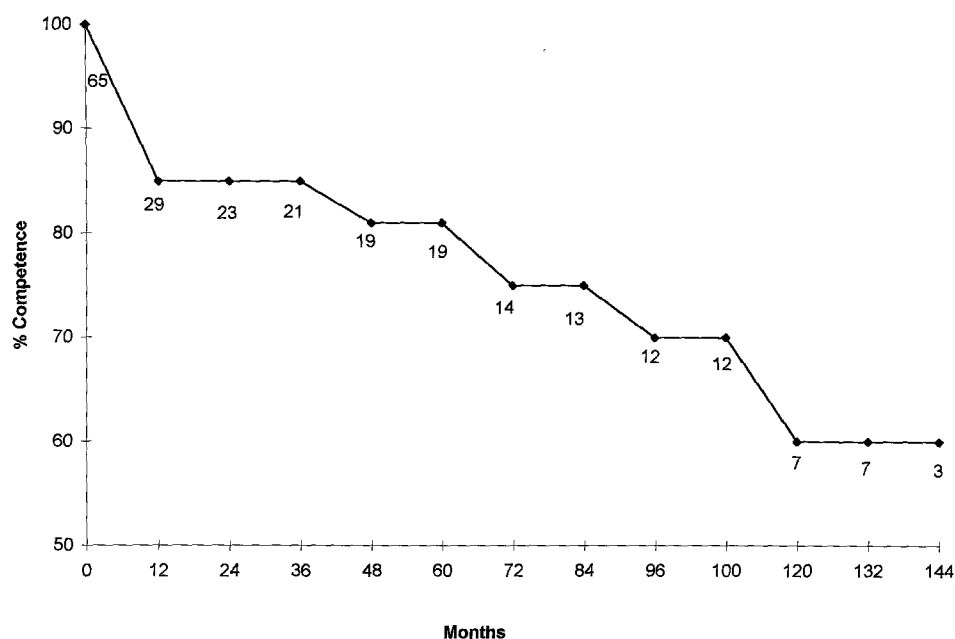


Fig. 2. Cumulative femoropopliteal venous competence after successful iliofemoral venous thrombectomy.

Table II. Cumulative femoropopliteal venous competence after successful iliofemoral venous thrombectomy

Interval (mo)	No. limbs at risk	No. failure	Duration of follow-up ends	Lost to follow-up	Death	Cumulative competence (%)	SEM (%)
0-12	65	8	0	25	3	100	0
12-24	29	0	0	5	1	84	6.2
24-36	23	0	0	2	0	84	7
36-48	21	1	0	1	0	84	7.3
48-60	19	0	0	0	0	80	8.2
60-72	19	1	2	1	1	80	8.2
72-84	14	0	1	0	0	75	10
84-96	13	1	0	0	0	75	10.4
96-108	12	0	0	0	0	69	11.1
108-120	12	2	3	0	0	69	11.1
120-132	7	0	0	0	0	56	14
132-144	7	0	4	0	0	56	14
144-156	3	0	0	0	0	56	21.4

Late results were assessed yearly by clinical examination and noninvasive investigations. At least one new ascending phlebogram was obtained during late follow-up for all patients who had good early clearance of the veins.

Iliofemoral vein patency was evaluated with directional Doppler scanning and ascending phlebography and femoropopliteal valve function with photoplethysmographic refill times before 1988. Then color-coded venous duplex examinations (Acuson

128, Acuson, Inc., Irving, Tex.) with a 7.5 MHz probe were routinely done to assess patency and competence. All examinations were performed by the same physician. Valvular incompetence was defined by pulsed Doppler evaluation as reflux of more than 1 second duration during a Valsalva maneuver against a 40 mm Hg column with the patient in erect position. The clinical outcome was graded according to the Ad Hoc Committee recommendations.¹³ Cumulative patency of the iliofemoral venous segment

Table III. Clinical results among 44 limbs available for follow-up 5 years after iliofemoral venous thrombectomy

Grade	Iliac vein		Total	
	Patent	Occluded	No.	%
0	32	3	35	93
1	5	1	6	
2	1	0	1	7
3	0	2	2	
	38	6	44	100

*According to the Reporting standards in venous disease. J Vasc Surg 1988;8:172-81.

was calculated by the life table method, as was femoral popliteal valve competence. Because patency rate was stable after 6 months and all the followed cases with rethrombosed iliac veins demonstrated a femoropopliteal valvular incompetence at 5 years ($n = 6$), we decided to consider for late evaluation of valve function the selected and homogeneous group of cases with patent iliac veins regardless of the early postoperative status of the femoropopliteal stem. Only the limbs that were checked for competence at least every 2 years or more frequently were considered for late evaluation: 30 limbs at 1 year, 19 at 5 years, and 7 at 10 years.

RESULTS

No operative deaths occurred, and no patient had a clinically evident pulmonary embolism. Immediate failure occurred in 12 cases. Iliac rethrombosis was ascribed to one or several of the following factors: severe stenosis of the iliac veins, 5; difficulties to make the arteriovenous fistula, 4; pelvic inflammatory status caused by recent history of cesarian section, 2, or appendicular abscess, 1; incorrect assessment of the age of the thrombus; and incomplete iliofemoral thrombectomy. Primary iliofemoral patency was 84%. Repeat thrombectomy was performed in 4 of the 12 early failures and was successful in 2. The 1-month secondary iliofemoral patency was 87%. Two rethromboses occurred after 2 and 3 months, and no more occurred after that time.

Among 31 iliofemoral venous thrombectomies performed on the left side where we found ilio caval stenosis, rethrombosis occurred in 8 (26%). These 8 cases were subdivided as follows: five of the 9 cases had tight stenosis (56%) and 3 of the 22 cases had moderate stenosis (14%).

Among 19 iliofemoral venous thrombectomies

Table IV. Clinical results among 16 limbs available for follow-up 10 years after iliofemoral venous thrombectomy

Grade*	Iliac vein		Total	
	Patent	Occluded	No.	%
0	13	0	13	94
1	0	2	2	
2	1	0	1	6
3	0	0	0	
	14	2	16	100

*According to the Reporting standards in venous diseases. J Vasc Surg 1988;8:172-81.

performed on the left side that was free of ilio caval compression and 27 right iliofemoral thrombectomies (total of 46), only 4 (7%) early failures occurred. So clearly thrombectomies on the left iliac veins with ilio caval stenosis had a less favorable outcome. The nine cases with tight anatomic stenosis caused by anatomic compression were all treated first by routine thrombectomy with balloon catheter. Great care was brought to clear the internal iliac vein with the suction maneuver. In case of failure, which always occurred within the first 4 postoperative days (five cases), and when the lower limb presented a huge tension, we performed venous restorations: two were indirect with a Palma saphenous vein bypass procedure, and one was direct. All three failed.

The mean follow-up time for the 77 operated limbs was 8½ years (5 to 13 years). Cumulative secondary patency (Fig. 1, Table I) and cumulative competence (Fig. 2, Table II) rates were 84% and 80%, respectively, after 5 years and 84% and 56%, respectively, after 13 years. Among 12 limbs with early reocclusion 6 were reviewed and demonstrated valvular incompetence at 5 years.

A minimum of 5-year follow-up was available for 50 of the 77 limbs. Six patients died. Five of the six had patent iliac veins at the time of death. Thirty-eight of 44 limbs checked after 5 years had patent iliac veins (86%), and six had early rethrombosis. Twenty-seven limbs were lost to follow-up (35%). Among these 22 were in the group of the 65 initially patent cases (34%), and five were in the group of the 12 early failures (41%).

The 5-year clinical results are listed in Table III. Ninety-three percent had either grade 0 or grade I venous insufficiency. The only two patients who had venous ulceration had early reocclusion of the iliac veins.

A minimum of 10 years of follow-up was available for 19 of the 25 limbs. Six (24%) were lost to follow-up. Three patients died. Of the sixteen survivors 14 (88%) had patent and 2 had occluded iliac veins.

The 10-year clinical results are listed in Table IV. Ninety-four percent had either grade 0 or grade I venous insufficiency, with only one patient having grade II venous insufficiency. No patient had venous ulceration.

DISCUSSION

Plate et al.⁸ completed a prospective randomized trial in patients with iliofemoral vein thrombosis comparing venous thrombectomy with standard anticoagulation. At the 5-year follow-up 37% of the patients who underwent surgery were free of symptoms, and 36% had a valvular competence compared with 18% and 11%, respectively, of the medically treated group. In the surgical group 69% of the limbs were grade I or II according to the Ad Hoc Committee classification.¹³

Kniemeyer et al.⁵ demonstrated with venous duplex ultrasonography that long-term valvular function was preserved in 45% of 157 limbs with venous thrombectomy and arteriovenous fistula. Thirty-five percent remained without symptoms. He emphasized that clinical results correlated to the extent of initial thrombosis. Postthrombotic syndrome was absent or mild in 69% of three level thromboses, 75% of iliofemoral thromboses, and 82% of isolated iliac vein thromboses. The importance of early clearance of the thrombosis was also stressed by Thiele et al.¹⁴ and Arnesen et al.¹⁵ with thrombolytic therapy. The same conclusion was made by Widmer et al.¹⁶ after anticoagulation or thrombolytic therapy.

In extensive multilevel venous thrombosis the age of the clot can be different at each level according to the developmental direction of the deep thrombosis, ascending from the femoropopliteal area or descending from the iliac vein. In some selected cases in which the age of the clot in one venous segment could be precisely assessed, complete relief of the thrombosis seemed easy to perform before the tenth or twelfth day in the iliac vein and before the fourth or fifth day in the femoropopliteal veins, but we were unable to draw objective and precise correlations between the age of the clots and the iliofemoral vein patency out of our whole material. Nevertheless the 7-day limit can be accepted as a median estimation according to our experience and in agreement with other data of the literature,⁴⁻⁶ and it seems advisable to remove as much thrombotic material as possible. Valvular incompetence is the rule after spontaneous

recanalization of femoral popliteal venous thrombosis is performed. Venous segments not involved with a previous thrombosis can become incompetent, if a more proximal venous obstruction is present.¹⁷ It has been stressed that when iliac veins were involved, late clinical and hemodynamic manifestations of venous insufficiency were more frequently encountered.¹⁴⁻¹⁶

We found that although our patients had good long-term clinical results and good iliac vein patency, a progressive loss of valvular function occurred. Similar deterioration of valvular competence was found in the Plate series,⁸ where iliac patency and competence of valves were encountered in 76% and 52%, respectively, after 6 months and in 71% and 36%, respectively, after 5 years in the surgical group. Lindner et al.¹⁰ made similar observations in medically treated patients when they found that most of the patients without clinical symptoms had hemodynamic abnormalities after a mean follow-up of 7 years.

It is apparent that the clinical result is frequently better than the functional studies during long-term follow-up, suggesting progressive deterioration of valvular function.³ After a successful venous thrombectomy is performed, it may be premature to say that the threat of a postthrombotic syndrome has disappeared even for an asymptomatic limb.

Nevertheless for preventing postthrombotic sequelae after iliofemoral venous thrombosis, operative thrombectomy appears to be more effective than anticoagulation or systemic thrombolytic therapy.^{8-10,13-15}

We did not find a correlation between preoperative clot extension and late outcome. Only the early postoperative iliofemoral vein patency appeared as a good criterion of late success.

The femoropopliteal competence was present after 5 years in 80% of the cases with patent iliofemoral vein and in none of those with rethrombosis.

The technical principles of iliofemoral thrombectomy are now standardized¹¹⁻¹²; however, proper selection of patients is a main condition of success. Venous thrombectomy with the specific goal of preventing the postthrombotic syndrome is to be proposed only to ambulatory patients with a good life expectancy. The clot age evaluated by history and duplex Doppler scanning must be less than 7 days, and the pelvic area must be free of tumor and infectious or inflammatory disease as confirmed by computed tomography scan. Conditions for creating a good arterial venous fistula must also be present. Iliocaval compression syndrome is not considered as a contraindication for thrombectomy.

In consideration of these guidelines we believe

that venous thrombectomy should be rehabilitated for the treatment of iliofemoral venous thrombosis.

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