Lower Extremity Hematoma as a Complication of Warfarinization in Patients with Artificial Heart Valves

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SUMMARY

Four cases of lower extremity hematoma in patients undergoing anticoagulant therapy after heart valve replacement are herein reported, with special emphasis on the comparative diagnostic value of ultrasonography and computerized tomography. Although conservative management is sufficient for patients with no neurological impairment, needle aspiration after autolysis of the hematoma, which can be confirmed by CT study, is also recommended. (*Jpn Heart J* 1999; 40: 239–245)

Key words: Anticoagulation therapy, Artificial heart valve, Leg hematoma, Computed tomography, Ultrasonography

WARFARIN plays an important role in the prophylaxis of thromboembolic disorders related to artificial heart valves and has been widely used all over the world for quite a long time. However, the risk of hemorrhage is also well-known in patients undergoing treatment with warfarin.^{1–4)} This paper presents four patients with acute hematoma in the lower extremity (LE) seen at this institution over the past 5 years. Characteristic symptoms, image studies and clinical courses are reported.

CASE REPORTS

Patient 1: A 63 year-old man, who had a past history of hepatitis, cardiac surgery [closure of an atrial septal defect, mitral valve replacement (MVR:

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Carpentier-Edwards porcine bioprosthesis), tricuspid annuloplasty (TAP: DeVega's method)] 43 months ago and several acute arterial embolic episodes of the extremity, was admitted due to the sudden onset of right thigh pain. Warfarin sodium (4.5 mg/day) was used with aspirin as an anticoagulant therapy. On admission, the physical examination was unremarkable, apart from some local tenderness and slight swelling of the inner-anterior aspect of the right thigh. Ultrasonography revealed a hematoma within the medial intermuscular septum and the vastus medialis muscle. Warfarin was stopped for 3 days and the symptoms subsided after conservative management for 2 weeks.

Five years later the patient was readmitted to our hospital with severe pain in the right lower leg. He had been making decorations for a local community festival which required exertion of the leg muscles. Physical examination upon admission showed that peripheral arterial pulses were easily palpable and there was an expansion of the leg. There was diffuse calf pain. Warfarin (3.5 mg/day) was used with aspirin at this time. Computed tomography (CT) of the legs was performed and a huge hematoma was noted in the right soleus and gastrocnemius muscles (Figure 1). Because INR was prolonged to 3.59 (% PT: 14.8%), anticoagulant therapy was stopped for 7 days. CT was useful for obtaining information on hematoma autolysis (Figure 2). A total of 50 ml of dark bloody fluid was obtained by needle puncture. The patient could walk without pain or any neurological problem at discharge.

Patient 2: A 56-year old woman with a history of hepatitis and annuloaortic ectasia (AAE) underwent Bentall's operation with a Björk-Shilley mechanical valve, and warfarin was started postoperatively. The patient had no bleeding or thromboembolic problem with mild warfarinization for 5.5 years. The patient

Figure 1. CT of the swollen leg in Case 1. A large hematoma is seen in the right gastrocnemius muscle.

Figure 2. Autolysis of the hematoma detected by a CT study in Case 1.

complained of the sudden onset of pain, swelling of the right leg and difficulty in walking. Physical examination was significant for the obvious mass in the left leg with tenderness. Ultrasonography confirmed the clinical impression of a large hematoma, 4 by 5 cm, in the medial head of the gastrocnemius muscle (Figure 3). The patient was advised to discontinue taking the warfarin for 4 days. The pain and swelling abated during the next 12 days without any intervention. The patient restarted the warfarin and was discharged, and she is doing well without any complications from the anticoagulant therapy for 5 years after the leg hematoma episode.

Patient 3: A 53-year old man with a past history of aortic and mitral valve replacement (AVR with a Björk-Shiley mechanical valve, and MVR with a Carpentier-Edwards porcine bioprosthesis) due to rheumatic heart valve disease used warfarin and aspirin for the prophylaxis of postoperative thromboembolic problems for 6 years. The patient was admitted to our hospital with sudden onset pain in the left leg and difficulty in walking. A leg hematoma was noted as a low echoic mass in the gastrocnemius muscle after ultrasonographic examination. Warfarin was stopped for 3 days and the pain and difficulty in walking subsided gradually over the next 12 days without any intervention. Re-do MVR was necessary due to primary tissue failure of the porcine Carpentier-Edwards valve 4 years after the leg hematoma complication. He is presently doing well without any bleeding complications at a 6 month review after re-do MVR with a St. Jude Medical mechanical valve.

Patient 4: A 64-year old man with a past history of hepatitis and re-do mitral valve replacement (re-do MVR with a St. Jude Medical mechanical valve due to

Figure 3. Ultrasonography study in Case 3. A massive hematoma is clearly noted as a soft density mass.

Table. Patients Characteristics

Patient No.	Age(y)/ Gender	Operation	Duration of warfarinization	Warfarin (mg/day)	Antiplatelet aggregant	% PT	Location of hematoma
1	63/M	ASDc/MVR/TAP	43 months	4.5	aspirin	28.6%	rt. AK
1	68/M	same as above	104 months	3.5	aspirin	14.8%	rt. BK
2	56/F	Bentall's op.	66 months	3	(-)	84.3%	rt. BK
3	53/M	AVR/MVR	72 months	2	aspirin	71.5%	lt. BK
4	64/M	MVR	126 months	2.5	(-)	24.1%	rt. AK

PT = prothrombin time; ASDc = atrial septal defect closure; MVR = mitral valve replacement; TAP = tricuspid annuloplasty; AVR = aortic valve replacement; AK = above knee; BK = below knee.

primary tissue failure of a prior Carpentier-Edwards porcine bioprosthesis) used warfarin for the prophylaxis of postoperative thromboembolic problems. The patient took warfarin for 10.5 years after the initial MVR. A loop diuretic was also administered and the serum uric acid level was raised to 9.2 mg/dl. After benzbromarone was concurrently administered with warfarin for 2 months, the patient was walking in the woods gathering wild mushrooms when he suffered

sudden severe pain in the right thigh. Although a hard mass was also noted on the inner surface of the thigh, difficulty in walking and ecchymosis were not noted as symptoms. After discontinuation of both benzbromarone and warfarin for 5 days, only the warfarin was resumed. The pain disappeared within the next 2 weeks without any interventional procedures. No bleeding was noted for 1 year after the thigh hematoma episode.

DISCUSSION

Hematoma in the L/E is an uncommon though not rare complication of anticoagulant therapy after heart valve replacement.⁵⁻⁷⁾ The possibility of the development of hematoma should be considered in patients with the sudden onset of L/E pain and anticoagulant therapy. Although carefully taking into account the patient's history, the development of symptoms and predisposing factors can be helpful in making a diagnosis, L/E hematoma is sometimes confused with other lesions such as deep venous thrombosis, phlegmon and lymph edema.^{6,8,9)} Typically, if there is a sudden onset of pain and a firm mass is found upon physical examination, a diagnosis can be easily made. However, it is not easy to diagnose some patients with severe leg hematoma only by physical examination because of leg swelling and tenderness. Ultrasonography is the first line investigation for this disorder.^{6,8,10,11)} Computed tomography (CT) gives us more useful information than ultrasonography not only for confirming the diagnosis but also for precise localization and extension of the hematoma and for understanding the pathophysiology of the clinical signs in the L/E hematoma and compressed surrounding tissue.

Prothrombin times were not exceedingly prolonged in cases 2 and 3; 84.3% and 71.5%, respectively. An oral antiplatelet aggregation agent (aspirin: 81 mg/day) was also used in cases 1 and 3. Anticoagulant therapy in itself was not a direct cause of the L/E hematoma.^{12,13)} Two of our 4 cases [Cases 1 (second episode) and 4] had apparent precipitating factors such as excessive muscle exertion and minor trauma during physical work. However, there were no precipitating factors noted in the other two patients. Once muscle disruption or vascular rupture has occurred in the L/E, the failure of coagulation due to warfarinization potentiates the formation of a hematoma. Unstable prothrombin times due to liver damage and the concurrent administration of benzbromarone and aspirin which enhances the anticoagulant action of warfarin,^{5,14)} were also noted as important factors.

Although conservative management including discontinuation of warfarinization is the principal route of therapy, prompt surgical decompression and hemostasis are indicated for patients with large progressing hematoma or for

patients with nerve compression.^{10,15,16)} There have also been reports recommending early surgical release of compression in patients with acute carpal tunnel syndrome as a complication of oral anticoagulant therapy.^{17,18)} Among our patients there were no cases presenting symptoms related to nerve compression. We selected conservative management with discontinuation of warfarinization for 3 to 7 days. Needle aspiration of the hematoma was conducted in Patient 1 with a large leg hematoma. CT studies provided useful information on the time course of hematoma lysis and the timing of aspiration (Figure 2).

The significance of warfarinization after heart valve replacement is dependent on the type of the implanted artificial valve and on the anatomical position of the replaced valve (aortic or mitral). In patients with a bioprosthesis in any position or with a mechanical prosthesis in the aortic position, temporary discontinuation of warfarinization can be easily carried out. Patients with a mechanical prosthesis in the mitral position and with repeated thromboembolic episodes have some potential disadvantages related to the cessation of anticoagulation. In these cases, it has been our policy to stop administering warfarin for a week with daily monitored prothrombin time. Intravenous heparin is started when the % PT recovers to 50%. Warfarin is resumed after 1 week discontinuation and heparin administration is gradually replaced with a change in PT. If there is any evidence of re-bleeding or expansion of the hematoma, prompt surgical hemostasis is indicated during the above conservative management.

Conclusion: L/E hematomas in 4 patients on long term warfarinization for prophylaxis of thromboembolism after cardiac valve replacement are reported. The diagnostic value of CT is emphasized for this disorder. Conservative management with temporary discontinuation of warfarin were sufficient in our patients. Additional needle aspiration of hematoma after autolysis which is confirmed by CT image can be performed.

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