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## Prosthetic valves thrombosis at mitral position: clinical recognition and surgical management

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## Prosthetic valves thrombosis at mitral position: clinical recognition and surgical management

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*During a 3-year period in Chulalongkorn Hospital, there were nine patients with prosthetic valve thrombosis at mitral position. Four of them were Sorin valves, another four were Carbomedics valves and the last was Metronic-Hall valve. Most of the patients had an acute exacerbation of heart failure and developed pulmonary edema. Prothrombin time was in the therapeutic range at the time of admission in 5 of the 9 patients. Echocardiogram was done in five patients to confirm the diagnosis. One patients died before reoperation. Emergency reoperation were undertaken in 8 patients for re-replacement of the prosthetic valves. Operative mortality rate was 37.5 per cent (3/8). These findings emphasize the importance of considering the diagnosis of thrombosed heart valves in patients with prosthetic heart valve who are seen with acute heart failure and pulmonary edema.*

**Key words:** *Prosthetic valve thrombosis, Mechanical valve thrombosis.*

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ผู้ป่วยจำนวน 9 ราย มีลิ่มเลือดอุดตันลิ้นหัวใจเทียมที่ตำแหน่งไมตรัลหลังจากการผ่าตัดเปลี่ยนลิ้นหัวใจ ที่โรงพยาบาลจุฬาลงกรณ์ ในช่วงระยะเวลา 3 ปี ลิ้นหัวใจเทียมที่เกิดการอุดตันเป็นลิ้นหัวใจเทียม Sorin 4 ราย, เป็นลิ้นหัวใจเทียม Carbomedics 4 ราย และอีก 1 รายเป็นลิ้นหัวใจเทียม Metronic-Hall ผู้ป่วยทั้งหมดมีอาการของหัวใจล้มเหลวและพบมีภาวะปอดบวมน้ำอย่างกระทันหัน ผู้ป่วย 5 ใน 9 รายมีระดับของ Prothrombin time อยู่ในช่วงการรักษาที่ยอมรับ ผู้ป่วย 5 รายได้รับการตรวจด้วยเครื่องตรวจคลื่นเสียงกระทบหัวใจ (Echocardiogram) เพื่อยืนยันการวินิจฉัย ผู้ป่วยรายหนึ่งถึงแก่กรรมก่อนที่จะได้รับการผ่าตัดแก้ไข ส่วนผู้ป่วยอีก 8 รายได้รับการผ่าตัดฉุกเฉินเพื่อเปลี่ยนลิ้นหัวใจเทียมอันใหม่ อัตราการตายภายหลังการผ่าตัด 37.5 % ดังนั้นหากพบผู้ป่วยที่ได้รับการผ่าตัดเปลี่ยนลิ้นหัวใจเทียมแล้วมีอาการหัวใจล้มเหลวและปอดบวมน้ำอย่างกระทันหัน ควรนึกถึงภาวะลิ้นหัวใจเทียมอุดตันจากลิ่มเลือดเป็นอันดับแรกๆ

A growing number of patients have prolonged survival after cardiac valve replacement. Long life-span increases the eventual risk of development of complication in these patients. Prosthetic valve thrombosis is one of the serious complication with high mortality concerning reoperation in these critically ill patients.<sup>(1-7)</sup> The incidence of thrombosis is highest at mitral position.<sup>(2,4,5,6)</sup> Noninvasive investigations such as echocardiography have been recommended in the diagnostic evaluation of prosthetic valve thrombosis.<sup>(7-9)</sup> In this communication, we present 9 patients with prosthetic valve thrombosis at mitral position who had been treated in our hospital.

### Material and methods

From October 1988 to September 1991, nine patients with prosthetic valves thrombosis were recognized and underwent surgical manage-

ment. There were 4 Sorin valves, 4 CarboMedic valves and one Metronic-Hall valve. (Table 1), Since 1981, 608 prosthetic heart valves were replaced in mitral position. There were 253 Metronic-Hall valves, 202 Starr-Edwards cage and ball valves, 108 Sorin valves, 42 Carbomedics valves, and 3 St.Jude valves. (Table 1) All of them were placed on an anticoagulation program with warfarin. The dosage was adjusted by frequent measurement of the prothrombin time. Anticoagulation was considered adequate when the prothrombin time could be maintained between 50 to 75% of the normal value. The over all incidence of prosthetic valve thrombosis is 1.5% (9 in 608 patients) at mitral position. The incidence of thrombosis in each valves were 0%, 0%, 0.4%, 3.7% and 9.5% in Starr-Edwards, St. Jude, Metronic-Hall, Sorin and CarboMedics valves respectively.

**Table 1.** Prosthetic valve use for mitral valve replacement (1981-1991).

Type of valve	No. of patients	No. of valve thrombosis
Medtronic-Hall	253	1(0.4%)
Starr-Edwards	202	0(0.0%)
Sorin	108	4(3.7%)
CarboMedics	42	4(9.5%)
St.Jude	3	0(0.0%)

### Results

Clinical data on the 9 patients with prosthetic valve thrombosis are summarized in Table 2. All of them were female and age between 30 to 60 years (mean 43.5 years). The interval between mitral valve replacement and dysfunction of the thrombotic valve ranged from 40 days to 63 months (median

time, 18 months). Systemic anticoagulation with warfarin was judged to be adequate (prothrombin time  $\geq 1.5$  times control) in 5 of the 9 patients at the time of diagnosis of prosthetic valve thrombosis. Four of nine patients had precipitating causes; two of them had discontinued warfarin (due to diarrhea in one and to prepare for tooth extraction in

another), one had low cardiac output after operation and the last patient had used Depo-provera (DMPA) for contraception over one year before thrombosis occurred.

**Table 2.** Summary of clinical data on patients with prosthetic valve thrombosis.

Patients No.	Age	Sex	Valve type	PT	Interval from insertion to thrombosis (mo)	Precipitating	Echo	Reoperation	Result
1	60	F	CM#29	$\geq 1.5$	1.33	low CO	done	no	death
2	41	F	CM#29	$\geq 1.5$	30	no	done	replace CE#27	survive
3	59	F	S#29	$\geq 1.5$	24	no	done	replace CE#29	survive, hemiparesis
4	32	F	S#29	$\leq 1.5$	5	no	done	replace SE#2M	survive
5	38	F	CM#27	$\leq 1.5$	9.25	diarrhea, discontinue warfarin	no	replace MH#27	DOT
6	35	F	S#27	$\geq 1.5$	54	no	no	replace SE#2M	DOT
7	39	F	S#31	$\geq 1.5$	12	no	no	replace SE#3M	survive
8	38	F	CM#25	$\geq 1.5$	18	discontinue warfarin, prepare for tooth extraction	no	replace MH#27	death, ARF
9	30	F	MH#31	$\leq 1.5$	63	Depo-provera (DMPA)	done	replace SE#3M	survive

All patients present with symptoms of dyspnea and congestive heart failure. chest roentgenography showed pulmonary venous congestion in all patients. The diagnosis of prosthetic valve thrombosis was made by clinical criteria in 5 patients and the other 4 had echocardiography to confirm the diagnosis.

The timing of reoperation depended on the clinical condition of the patients and the time necessary for establishing the diagnosis of thrombosis of the prosthetic valve. Reoperation were performed in 8 patients except one who died before the time of reoperation. There were 2 Carpentier-edwards

bioprosthesis valves, 4 Starr-Edwards cage and ball valves and 2 Metronic-Hall valves used for rereplacement of the mitral valve 3 patients died within 7 days after reoperation, two of them could not be weaned off from cardiopulmonary bypass and another one died from acute renal failure. Operative mortality rate was 37.5% (3/8) and over all hospital mortality was 44.4% (4/9)

Nonfatal complication occurred in one patient with hemiparesis post-reoperation, and which recovered dramatically 2 months postoperatively.

### Discussion

The reported incidence of prosthetic valve thrombosis are 1 to 8% depended on the valve's design.<sup>(4,5,10-18)</sup> In our series we found that CarboMedics valve has the highest incidence of thrombosis (9.5%), and Starr-Edwards cage and ball valve has the lowest incidence of thrombosis (0%). At operation it was found that thrombotic material grew into the hinge joint of the valve leaflets that just situated below the level of the annulus and caused dysfunction of the valve leaflets in all thrombotic Carbomedics valves. Thus we postulate that the design of the valve is of paramount importance.

Patients with prosthetic mitral valve thrombosis usually have a rapid catastrophic course. The most salient finding on clinical examination of these patients is the absence or attenuation of the prosthesis-related closing sound.

Echocardiography is very useful to confirm the diagnosis accurately especially in an experienced hand. There were no false negative or false positive in our series. However, we could confirm the diagnosis of the

thrombotic valve by echocardiography only 5 in 9 patients, due to the fact that the other 4 patients were in poor condition and required emergency surgery. Therefore the clinical signs history and are of significance and adequate to establish the diagnosis in these critically ill patients.

Recently, some investigators reported the successful use of thrombolytic therapy to manage prosthetic mitral valve thrombosis.<sup>(5,19)</sup> We believe that this technique has some potential hazards and therefore, we will strongly advise reoperation as the primary treatment of thrombosed prosthetic valve.

The operative mortality of reoperation for prosthetic valve thrombosis was directly related to the patient's preoperative condition and surgical experience.<sup>(14,18,20)</sup> The high mortality rate in our series is due to the delay both in diagnosis and in referral of patients to cardiac surgical unit. Therefore, we emphasize the importance of establishing early diagnosis of thrombosed valves in patients who have prosthetic heart valve with acute congestive heart failure and pulmonary edema. Early notification to the surgical team is a life saving.

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