

Photogravure

The Association Between the Use of Tourniquet During Operation and the Development of Pulmonary Thromboembolism and Deep Vein Thrombosis

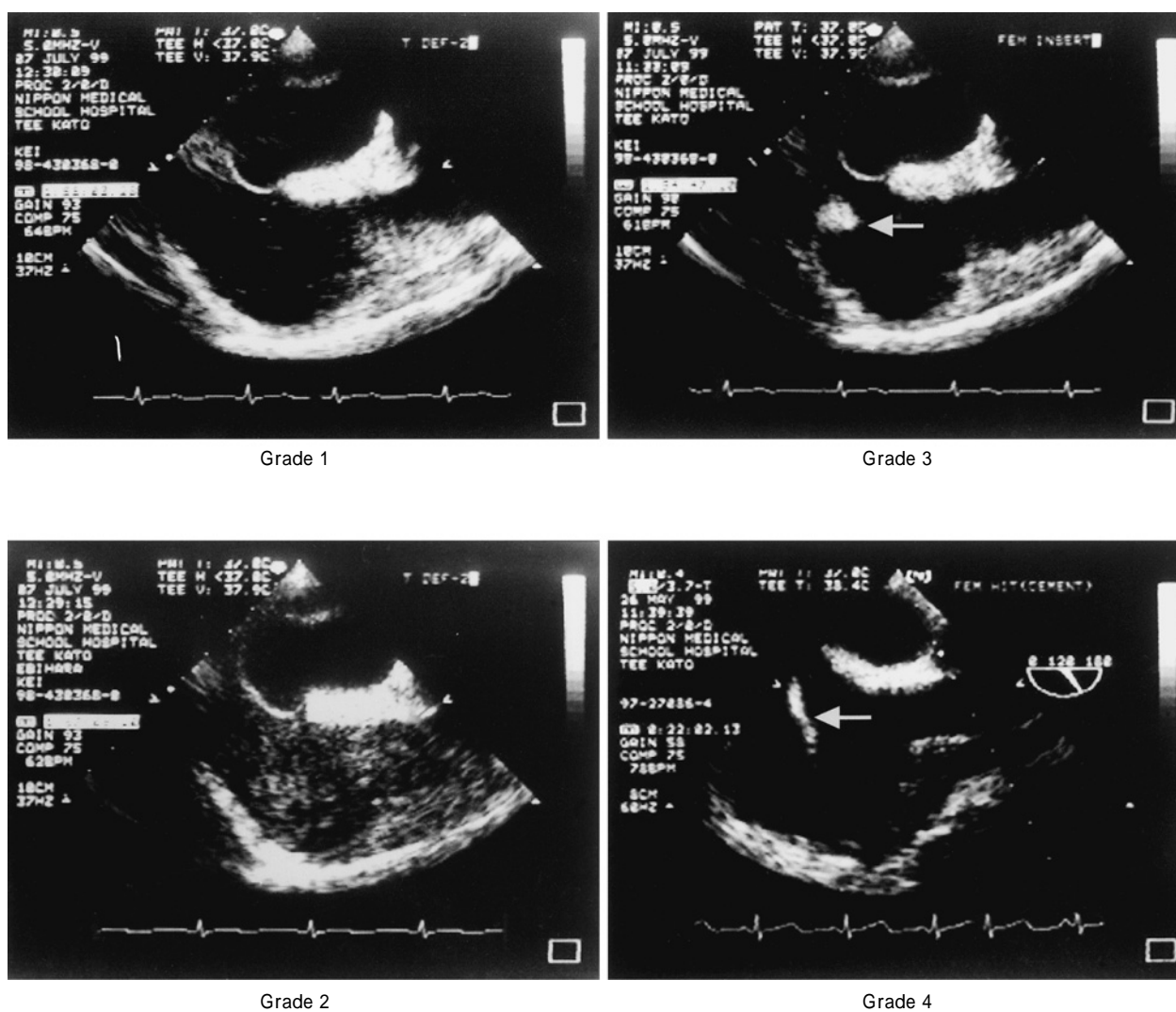
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Fig. 1

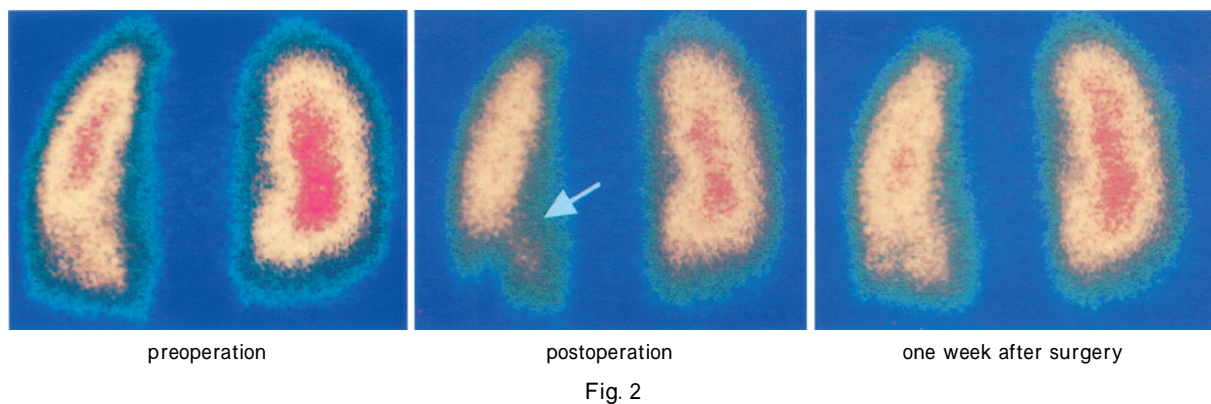


Fig. 2

Pulmonary thromboembolism (PTE) and deep vein thrombosis (DVT) are serious complications after total knee arthroplasty (TKA) or total hip arthroplasty (THA). How to prevent and deal with these complications are important issues. So-called embolic showers were observed on transesophageal echocardiography (TEE) after the tourniquet was deflated in TKA¹⁻³. However, it is unclear whether these phenomena affect postoperative PE or not. In addition, using a tourniquet may also initiate DVT. We suggest that TKA without a tourniquet may reduce a patient's risk of postoperative PTE or DVT.

TEE images under anesthesia were recorded continuously and analyzed by classifying the degree of echogenic particles from grades 1 to 4 as shown in **Fig. 1**. In the "with tourniquet group", TEE revealed fine echogenic particles after deflation of the tourniquet in all patients, and these were rarely observed during the operation. Remarkable echogenic particles (grades 2 to 3) were observed in all 19 patients with rheumatoid arthritis (RA). In the "without tourniquet group", fine echogenic particles (grades 1 to 2) were found for several seconds in 13 out of 18 patients with RA during insertion of the intramedullary rod and in 12 during raising of the lower leg to dress the elastic bandage postoperatively⁴. **Fig. 2** shows a postoperative perfusion lung scan with a tourniquet and this case does not apparently show symptomatic PTE. A tourniquet operation will promote the risk of developing PTE or DVT. RA patients carry a greater risk of developing thrombosis. Our results suggest that a tourniquet-less operation may reduce PTE or deep vein thrombosis in RA patients.

References

1. Berman AT, Parmet JL, Harding SP, Israelite CL, Chandrasekaran K et al: Emboli observed with use of transesophageal echocardiography immediately after tourniquet release during total knee arthroplasty with cement. *J Bone Joint Surg Am* 1998; 80: 389-396.
2. Parmet JL, Berman AT, Horrow JC, Harding S, Rosenberg H: Thromboembolism coincident with tourniquet deflation during total knee arthroplasty. *Lancet* 1993; 341: 1057-1058.
3. McGrath BJ, Hsia J, Epstein B: Massive pulmonary embolism following tourniquet deflation. *Anesthesiology* 1991; 74: 618-620.
4. Wauke K, Nagashima M, Kato N, Ogawa R, Yoshino S: Comparative study between thromboembolism and total knee arthroplasty with or without tourniquet in rheumatoid arthritis. *Arch Orthop Trauma Surg* 2002; 122: 442-446.

Fig. 1 Classification of transesophageal echocardiography (TEE) findings (Quoted from Wauke K *et al.* Comparative study between thromboembolism and total knee arthroplasty with or without tourniquet in rheumatoid arthritis. *Arch Orthop Trauma Surg* 2002; 122: 442-446.)

Grades 1 and 2 show a few emboli, and a cascade of many fine emboli. Grades 3 and 4 show a cascade of fine emboli with embolic masses more than 1 cm in diameter (arrow) and a cascade of fine emboli with embolic masses more than 3 cm in diameter (arrow).

Fig. 2 Perfusion lung scan (posterior view) shows a perfusion defect in left lower lobe (arrow). Each perfusion scan shows a preoperative scan, a postoperative scan, and a scan at 1 week after surgery.