

PULMONARY EMBOLISM FOLLOWING SHOULDER ARTHROPLASTY

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Background: While there have been numerous reports concerning the risk of pulmonary embolism after knee and hip arthroplasty, no such information is available for shoulder arthroplasty, as far as we know. The purpose of this study was to determine the prevalence of pulmonary embolism following shoulder arthroplasty.

Methods: A review of 2885 consecutive patients who underwent primary shoulder arthroplasty at our institution between June 30, 1981, and June 30, 2001, was performed to identify all patients who sustained a pulmonary embolism.

Results: During this time-period, five patients sustained a pulmonary embolism following shoulder arthroplasty. Three of the five presented with symptoms that were originally attributed to causes other than pulmonary embolism. None of the patients sustained a fatal pulmonary embolism.

Conclusions: The data from this study demonstrate that pulmonary embolism is an uncommon complication of shoulder arthroplasty and that surgeons should have a high degree of suspicion if patients have respiratory difficulty following shoulder arthroplasty.

Pulmonary embolism is a well-recognized complication of hip and knee arthroplasty. Multiple studies have defined the risk factors for the development of a pulmonary embolism, provided data on the prevalence, and determined the probability of death resulting from a pulmonary embolism following knee and hip arthroplasty. However, minimal information is available on the risk of pulmonary embolism associated with shoulder arthroplasty. Currently, we know of only one case report in the literature that describes pulmonary embolism following shoulder arthroplasty¹. The purpose of the present study was to determine the prevalence of pulmonary embolism following shoulder arthroplasty.

Materials and Methods

Between June 30, 1981, and June 30, 2001, 2885 primary shoulder arthroplasties were performed at our institution; these included 577 hemiarthroplasties and 2308 total shoulder arthroplasties. Patients were identified with the use of a total joint registry that prospectively maintains records

on all patients who have undergone a total joint arthroplasty at our institution since 1969. The complications that occur during hospitalization and the course of clinical follow-up are recorded by the registry. Additionally, patients are contacted by the total joint registry on a scheduled basis to assess their status and record any complications that have occurred.

Results

Postoperatively, five patients sustained a pulmonary embolism that was confirmed by either computed tomography scan or ventilation-perfusion scan. Four of the patients had had a hemiarthroplasty and one, a total shoulder arthroplasty (Table I). The overall prevalence of pulmonary embolism was 0.173%. None of the pulmonary emboli were fatal. The time of the diagnosis of pulmonary embolism ranged from the day of surgery to postoperative day 7. None of the five patients had a history of a pulmonary embolus. All five patients were women who ranged in age from forty-seven to eighty years (mean, sixty-eight years). One patient had undergone prior arthroscopic débridement of a labral tear. The remaining four patients had no history of shoulder surgery.

On postoperative day 3, three patients (Cases 1, 2, and 3) presented with prodromal symptoms that were attributed to other causes, delaying the diagnosis.



TABLE I Data on the Patients

Case	Diagnosis	Procedure	Medical History
1	Osteoarthritis	Total shoulder arthroplasty	Hypertension
2	Acute fracture	Hemiarthroplasty	Hypothyroidism, alcohol use
3	Malunion	Hemiarthroplasty	Hypertension, diabetes mellitus
4	Acute fracture	Hemiarthroplasty	Lupus erythematosus, thrombocytopenia
5	Avascular necrosis	Hemiarthroplasty	Hypertension

A seventy-two-year-old woman (Case 1) underwent a total shoulder arthroplasty for the treatment of osteoarthritis. On postoperative day 3, shortness of breath developed and she was diagnosed as having exercise-induced respiratory distress. The patient subsequently experienced a respiratory arrest and was successfully resuscitated. A pulmonary embolus was diagnosed on the basis of the findings of a ventilation-perfusion scan.

An eighty-year-old woman (Case 2) underwent a hemiarthroplasty for the treatment of a comminuted fracture of the proximal part of the humerus. On postoperative day 3, disorientation and shortness of breath developed. The original diagnosis was alcohol withdrawal. When the shortness of breath increased, the patient was subsequently diagnosed as having a pulmonary embolus, according to the findings on a computed tomography scan.

A sixty-six-year-old patient (Case 3) underwent a hemiarthroplasty for the treatment of a malunion of the proximal part of the humerus. Three days following surgery, shortness of breath developed. She was evaluated by the medicine service and was diagnosed as having asymptomatic increased troponin. An ultrasound examination of the lower extremities was negative for a clot. One week following discharge from the hospital, the patient was diagnosed as having a pulmonary embolism on the basis of a computed tomography scan.

Two patients had a correct diagnosis on the initial evaluation.

A forty-seven-year-old patient (Case 4) with a history of systemic lupus erythematosus sustained a four-part fracture of the proximal part of the humerus. Because of preoperative thrombocytopenia, the surgery was delayed three days while she received steroids and intravenous immunoglobulin therapy to increase the platelet count. The patient was hypoxic immediately following surgery and underwent a computed tomography scan that confirmed a pulmonary embolism.

A seventy-four-year-old patient (Case 5) underwent a hemiarthroplasty for the treatment of avascular necrosis secondary to trauma. On postoperative day 2, dyspnea, tachypnea, and hypoxia developed. A computed tomography scan confirmed the diagnosis of a pulmonary embolus. While being managed with heparin, the patient subsequently had development of a large hematoma that required delayed débridement.

Discussion

While there has been extensive study concerning pulmonary embolism following total knee and hip arthroplasty, little information is available concerning pulmonary embolism after shoulder arthroplasty. The data from this study indicated that the prevalence of pulmonary embolism following shoulder arthroplasty is low. Additionally, the pulmonary embolism that developed among the patients at our institution who had undergone primary shoulder arthroplasty was nonfatal.

This study raises serious concerns about the possibility of misinterpretation of early symptoms. When pulmonary embolism did occur, potential prodromal symptoms were attributed to other causes in three of the five patients. In addition, all four patients who had ultrasonography or impedance plethysmography studies of the lower extremity had negative findings. Only one patient underwent ultrasonography of the upper extremity. Therefore, there is concern with regard to the site of origin of the clot (the pelvis or the upper extremity), and one should be aware of all of the potential sources of deep-vein thrombosis following shoulder arthroplasty.

One patient in this study had a complication, a large hematoma in the shoulder, as a result of anticoagulation therapy with heparin. Patients who sustain a pulmonary embolism and are managed with anticoagulation should be made aware of the potential complications, including the development of a hematoma and the need for additional shoulder surgery.

TABLE I (continued)

Confirmatory Test	Ultrasonography or Impedance Plethysmography Studies	Treatment
Ventilation-perfusion scan	Normal findings on impedance plethysmography	Inferior vena cava filter, heparin followed by Coumadin (warfarin)
Computed tomography scan	Not obtained	Heparin followed by Coumadin (warfarin)
Computed tomography scan	Negative findings on ultrasound studies of lower extremities	Heparin followed by Coumadin (warfarin)
Computed tomography scan	Negative findings on ultrasound studies of lower extremity and right upper extremity	Heparin followed by Coumadin (warfarin)
Computed tomography scan	Negative findings on ultrasound studies of lower extremities	Heparin followed by Coumadin (warfarin)

The data from this study demonstrate that pulmonary embolism is a rare complication of shoulder arthroplasty. However, surgeons should have a high degree of suspicion for pulmonary embolus when a patient has development of respiratory difficulty following shoulder arthroplasty even if noninvasive studies of the lower extremity do not show a clot. ■

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Reference

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