

⁹⁹Tc^m-Labeled Leucocyte Scan for detecting Infection of Vascular Graft involving Groin

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Abstract

The clinical value of Technitium-⁹⁹Tc^m leucocyte in detecting early post-operative infection of prosthetic vascular grafts, to and from the femoral artery involving groin dissection is assessed. Twenty-five patients underwent bypass procedure using either Dacron or PTFE grafts. ⁹⁹Tc^m labeled leucocyte scans were undertaken between 6-8 days following the bypass procedure. Fourteen patients had normal scans and no subsequent evidence of graft infection. the remaining 11 patients had abnormal scans discharge. These patients underwent serial scanning until the scan normalised or graft infection developed. Of 11 patients, who had abnormal initial scans, 2 developed clinical groin infection and were thus true positive, 7 patients subsequently had normal scans, 2 patients died of other causes. The sensitivity of ⁹⁹Tc^m labeled leucocyte scan is 100%, but unlike some previous reports, we found a low specificity. The graft material used did not make any difference as far as the sensitivity or specificity of detection of graft infection was concerned (JPMA 50:186, 2000).

Introduction

Prosthetic graft infection is a serious complication with high morbidity and significant mortality. Early diagnosis and treatment is therefore important. Computed tomography has a low sensitivity¹ and III Indium labeled leucocytes are poorly specific², especially in the early post operative period following arterial graft procedure involving groin dissection. ⁹⁹Tc^m labeled leucocyte scans have been shown to demonstrate 100% sensitivity in detecting graft infection and more importantly, a very high specificity of 89% for aortic grafts in the early post operative period³.

The purpose of this prospective study was to determine the sensitivity and specificity of ⁹⁹Tc^m labeled leucocyte scan in detecting infection in arterial grafts involving groin dissection.

Patients and Methods

Twenty-five patients admitted for bypass graft operation involving one or both groins gave informed consent to participate in this study. There were 21 men and 4 women with ages ranging from 39 to 76 years. Axillobifemoral grafts were inserted in 6 patients, 3 patients had femoro-femoral cross over graft, 14 had femoro-popliteal grafts, one had an aorto-bifemoral graft and another an iliofemoral graft. There were 35 groin dissections and femoral anastomosis. Eighteen cases had PTFE (Gore-Tex) graft and rest Collagen Impregnated Hemashield Dacron graft. All patients received pre-operative intravenous antibiotic prophylaxis.

⁹⁹Tc^m labeled leucocytes were prepared using a method based on that of Danpure⁴; 50 ml of blood was sedimented and centrifuged to obtain a mixed leucocyte pellet. This was resuspended in autologous cell free plasma and incubated with ⁹⁹Tc^m hexametazine before reinjection into the patient. The injected activity was approximately 200MBq (estimated medication dose 3.5mSv). Imaging was performed within 1.5 hours after re-injection followed by delayed images at 3-4 hours using an IGE Medical systems 400AC gamma camera (IGE Ltd., Slough, UK) and a low energy, all purpose collimator. A scan was graded positive if any part of the graft was visually more intense than adjacent vascular features, or where there were no comparable features, if the graft was clearly visible. The objective of performing an early image was to reduce the possibility of misinterpretation due to

bile excretion of non cell bound activity.

The influence of graft type of scan results was assessed by comparison of proportions using a continuity correction. ⁹⁹Tc^m labeled leucocyte imaging was carried out between 6 and 8 days post-operatively and repeated at regular intervals if the previous scan was abnormal, until the scan normalised or the patient developed clinical signs of infection. All patients were followed up in the outpatient clinic at regular intervals. The period of follow up ranged from 5 to 18 months.

Results

Fourteen of the 25 patients had a normal initial ⁹⁹Tc^m labeled leucocyte scan. These patients remained well with no evidence of graft infection in the follow up period. The remaining 11 patients had abnormal initial scans. Two of these patients developed clinical signs of infection. Of these, one patient had his femoro popliteal graft excised 3 months after its insertion. Two months later, he died of myocardial infarction. The second patient had infection in his axillo bifemoral graft. The graft was excised 7 months following insertion and the patient is alive and well.

Of the remaining 9 patients with abnormal initial scans, 2 died of unrelated causes. Neither of the two showed clinical evidence of graft infection. The remaining 7 patients have had normal ⁹⁹Tc^m labeled scans since and none has post operative graft infection during follow up period (5-18 months). Of the 11 initial positive scans, 7 were PTFE and 4 Dacron grafts. We have not demonstrated that either material is more likely to get infected in these small group of patients.

Discussion

^{99m}Tc-labeled leucocyte scan has been used in detection of various types of post operative infections⁵. Early detection of occult prosthetic graft infection continues to be difficult yet important clinical goal. Earlier reports have shown that Scintigraphy has an accuracy rate of about 90%^{2,6-10}. However, other studies failed to draw an identical conclusion. One study of 61 patients (36 with vascular graft, 25 control), gave impressive results. All 20 infected grafts were detected with ^{99m}Tc-HMPAO leucocyte scan. The sensitivity and specificity of the scan in the detection of infected graft were 100%¹¹. Another study looked at the results of 21 patients with graft infection retrospectively. It showed a sensitivity of 53%, a specificity of 100% and an accuracy of 66%. The conclusion was that a negative ^{99m}Tc^m-labeled leucocyte scan was of limited value in ruling out a vascular graft infection¹², yet another report showed a high specificity of ^{99m}Tc^m labeled leucocyte scan in the early post-operative period following aortic grafts³.

Our study looked only at the patients with grafts involving the groin. We found that although the sensitivity of the test in diagnosing femoral graft infection was 100%, the specificity was low (61%). Nine of the 11 patients with initial abnormal results did not show any clinical or laboratory evidence of infection. Two patients died of other causes, 3 and 6 months following an abnormal scan. They had no clinical or laboratory evidence of graft infection. The scan in rest of the 7 returned to normal. Continued ^{99m}Tc^m uptake in the groin probably represents a period of graft incorporation and resolution of a sterile inflammatory process around the anastomosis. We found the scan a very sensitive though poorly specific way to diagnose the graft infections in groin in the early post operative period.

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