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Bone allograft contamination in multiorgan and tissue donors

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Abstract Multiorgan and tissue donors offer a large quantity and high quality of bone allograft that cannot be obtained from living donors. The risk of bone contamination must be borne in mind if secondary sterilization is not performed. The bacteriological cultures of 270 bone segments obtained from 53 multiorgan or tissue donors were analysed to study the relationship between previous organ and tissue procurements and bone retrieval contamination. We concluded that no significant differences in bacterial contamination percentage were found for each type of previous organ and tissue procurement, nor in the number of teams per donor.

Introduction

The general purpose of a bone bank is to provide safe and effective allografts for patients [5]. Sterile bone recovery in an operating theatre is required for the collection of bone allografts transplanted without undergoing secondary sterilization [6]. Cultures from all collected bones must be taken, and contaminated allografts discarded [5, 6].

In contrast to living donors, multiorgan and tissue donors allow recovery of long bones (femurs, tibiae, fibulae, humeri, radii, ulnae), iliac crest, and hemipelvis, as well as bone-tendon-bone complexes such as patella-patellar- tendon-tibial tubercle grafts, Achilles tendons with or without bone blocks, tibial tendons, and tissues obtained for special purposes [9].

The goal of this study was to analyse the relationship between previous organ and tissue procurements with bone sample contamination.

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Materials and methods

We analysed the organ and tissue procurements that preceded the retrieval of skeletal tissue from a total of 270 bone allografts obtained from 53 non-living donors. In order to study the contamination of bone allografts, cultures of the each bone segment were performed.

Donor selection and testing were carried out by the transplant procurement management team; to be accepted, donors had to comply with the standards of the European Association of Tissue Banks [5] and European Association of Musculo-skeletal Transplantation [4]. Hepatitis B virus surface antigen, hepatitis C virus antibody, human immunodeficiency virus antibody and syphilis serology were tested in all donors. The grafts were obtained under strictly aseptic conditions in the operating theatre where multiorgan recoveries are usually performed. In all cases bone procural was the last procedure of the multiorgan and tissue donors. Bacteriological cultures were performed on each bone by swabbing prior to packaging in sterile plastic bags. Samples were initially inoculated in thioglycolate broth for 5 days; if the broth became cloudy, subcultures on blood agar plates were performed under aerobic and anaerobic conditions. The grafts were stored in a freezer at –80° C. Contaminated bones were discarded.

Statistical analysis was performed using corrected chi-squared test in order to identify significant factors contributing to bacteriological contamination of the bone allografts.

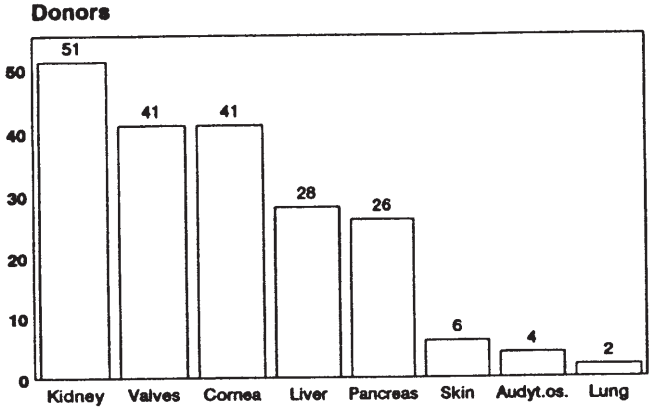

Fig. 1 Previous organ and tissue procurements in 53 donors

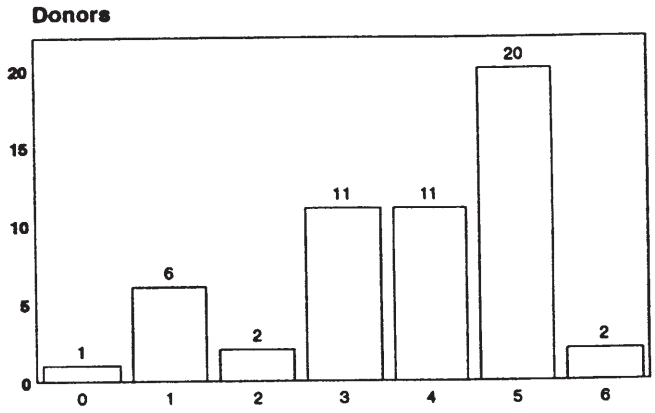

Fig. 2 Number of previous organ and tissue procurements per donor

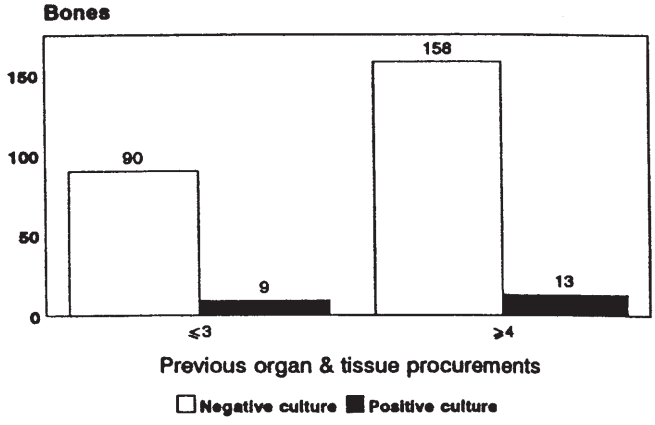

Fig. 3 Distribution of the 270 bone cultures performed in each retrieved segment. Relationship between bone contamination and number of previous organ and tissue procurements (three or less, and four or more teams). No significant difference between the groups ($P = 0.84$)

Table 1 Bone allograft contamination rate when organs and tissues were obtained; in no case was the difference significant

Organ or tissue	Contamination if obtained (%)	Contamination if not obtained (%)	*P*
Kidney	8.7	10	0.82
Liver	10.8	4.9	0.12
Pancreas	8.5	7.7	0.99
Lung	0	8.4	0.71
Cornea	8.8	5.4	0.58
Heart valves	6.9	12.9	0.24
Auditory os.	0	8.8	0.33
Skin	3.1	8.8	0.44

Results

The distribution of previous organ and tissue procurements of the 53 donors is shown in Fig. 1. The number of previous procurements per donor were from none in one case to six in two (mean 3.75) (Fig. 2). There were 22 positive cultures from 270 bones (8.1%) with a preponderance of Gram-positive cocci. The contamination rate of the grafts in relation to each previous organ or tissue procured is shown in Table 1; in no case was the difference significant according to the cross-table study. The analysis of the contamination rate and the number of previous procurements (three or less, and four or more) (Fig. 3). did not show a significant difference either.

Discussion

Sterile bone recovery is an effective method if the standards of the tissue banking associations [4, 5] are strictly followed [1]. The reported contamination rates in non-living donors are usually less than 15% [1, 3, 9]; Veen [10] reported an overall contamination of 54.9%, but the method used for detecting contamination can influence the outcome of the test. The percentage of positive cultures in this study (8.1%) coincides with the dominant trend in the literature [1, 3, 9].

Veen [10] reported a higher percentage of bone contamination by micro-organisms of low pathogenicity in organ donors than non-organ donors, the reason being that many people are present in the operating theatre and, that the number of colony-forming units increase in the room [7]. Coinciding with Deijkers et al. [2], in this study no significant differences in the bone contamination percentage were found for each type of previous organ and tissue procurement, or for the number of teams (three or less, and four or more) per donor. All donors of this series were organ and/or tissue donors, and a perfect coordination by the transplant procurement management team was performed. Each retrieval team was constituted by as few surgeons as possible in the knowledge that more procurements might be carried out.

Multiorgan and tissue donors allow us to recover allografts that are impossible to retrieve from living donors (long bones, massive allografts, tendons). The results of this study show that previous organ or tissue procurements are not significant factors in the bacterial contamination rate of bone allografts.

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