INTRODUCTION:

Inadvertent contamination of the hamstring autograft during ACL reconstruction is infrequent, but can result in significant complications. This occurs most commonly when the graft is accidentally dropped onto the operating room floor. Up to 25% of fellowship-trained sports medicine surgeons report experiencing at least one such event. Other studies have demonstrated contamination rates of routine graft harvesting maybe as high as 12% despite no apparent contamination occurrence. Following graft contamination, a surgeon faces a surgical dilemma. Potential options include harvesting another type of graft, switching to allograft tissue, or attempting to decontaminate the graft.

While other studies have investigated the effectiveness of decontamination of various autologous and allograft tissue, no studies have specifically examined the decontamination of hamstring autograft tissue. The purpose of this study is to evaluate bacterial contamination of hamstring autografts during harvest and to determine whether these grafts may be adequately sterilized with various cleansing techniques.

METHODS:

This study was submitted for IRB review at our institution and granted exemption. Thirty consecutive patients undergoing hamstring tendon autograft ACL reconstruction were included in the study. When necessary, the surgical area was shaved preoperatively. Skin preparation was performed using ChloraPrep® (2% Chlorhexidine Gluconate/70% Isopropyl Alcohol). All patients were given routine single-dose antibiotics (2nd generation cephalosporin unless allergic) prior to the starting incision.

Semitendinosus and gracilis tendons were harvested using standard technique. Muscle was then removed from the tendons. Both tendons were then cut to a length of 22 cm, and a quadruple-stranded ACL graft was constructed. The excess tendon tissue was then taken to a sterile side table and divided into six segments (ranging in size from 0.8 cm to 1.6 cm) depending on the length of tendon harvested. The segments were labeled A thru F. One segment was sent for culture as a control (A). The second segment (B) was dropped on the floor adjacent to the surgical field, immediately retrieved (in less than 5 seconds) using sterile forceps, and sent for culture. The remaining four segments were dropped onto the floor adjacent to the surgical field for fifteen seconds. One segment was then cultured after being retrieved from the floor (C). The remaining three segments were soaked in normal saline (D), 4% Chlorhexidine (E), or double antibiotic solution composed of bacitracin and neomycin (F) respectively for 3 minutes and then cultured. The floor was then swabbed at the site where the specimens were dropped and that was sent for culture (G).

RESULTS SECTION:

Positive cultures were seen (Table 1) in the control group (7/30), group B (10/30), group C (7/30), group D (9/30), group E (1/30), group F (1/30) and group G (19/30). Sixteen total organisms (figure 1) were identified with Staphylococcus aureus being the most common. Statistical analysis were performed and dropped grafts rinsed in both double antibiotics solution and chlorahexadine solution were significantly different than control (p<0.05). However, there was not a significant difference between grafts retrieved < 5 secs vs. 15 secs from the floor.

DISCUSSION:

In our study, inadvertent contamination was found in (23%) of specimens sent directly to lab following harvesting. None of these patients developed any type of clinical infection postoperatively. A similar phenomenon has been described elsewhere, which may present as a possible sources of contamination. There was also only one positive culture for both the double antibiotic solution and 4% Chlorhexidine groups. This provides further evidence that dropped ACL grafts can be safely decontaminated in a reasonably short period of time using agents readily available in most operating rooms.

Fifteen seconds was chosen as the amount of time for the tissue to remain on the floor as it seemed like a reasonable amount of time for the graft to be steriley retrieved in a real operating room environment. Immediate graft retrieval (“the 5-second rule”) did not affect the rate of contamination when compared to fifteen second exposure (33% vs 23%, p=0.39). Longer contamination exposures were not evaluated as this was not felt to be realistic in the operating room setting.

The disparity between positive floor culture swabs (63%) and untreated contaminated graft specimens (on floor for 15 secs) (23%) is not felt to be realistic in the operating room setting.

SIGNIFICANCE:

This study supports the practice of decontaminating a dropped ACL hamstring autograft using either 4% Chlorhexidine or double antibiotics solution (bacitracin and neomycin). Specimens should be retrieved steriley and washed for at least 3 minutes. This study also demonstrates no advantage in retrieval time of less than 15 seconds.