# DOUBLE OR "TRIPLE" HAMSTRINGS HARVESTING FOR ACL RECONSTRUCTION? - IS "KILLING" THE HAMSTRINGS A GOOD IDEA?

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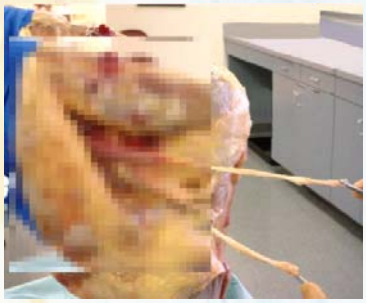
## INTRODUCTION

During the past decade the number of hamstring tendons (ST-G) versus the patellar tendon for ACL grafts has increased dramatically. Two potential advantages of double tendon grafting are the availability of much more material for grafting and the possibility of using more rigid fixation.

The Sartorius has not been a source of graft tissue because of its fascia-like insertion into the tibia. Thus, no attention has been given to the possible consequences of the loss of function of the Sartorius. We are not aware of any reports concerning this issue. It seems logical that in many cases during both ST and ST-G harvesting, the Sartorius tibial tendon insertion might also be damaged. As a consequence, the double hamstring harvesting may turn into a "triple" harvesting, thus disabling the entire pes anserinus complex.

The Hamstrings are muscles of constant universal presence, with well developed muscle bellies and tendon attachments of significant size, in favour of a significant physiological function. The bulk of Sartorius is noticeable in this specimen. Therefore, disabling the action of the entire muscle complex would seem unwise.



### WHY DOES HAMSTRING HARVEST SEEM TO BE WITHOUT CLINICAL CONSEQUENCES?

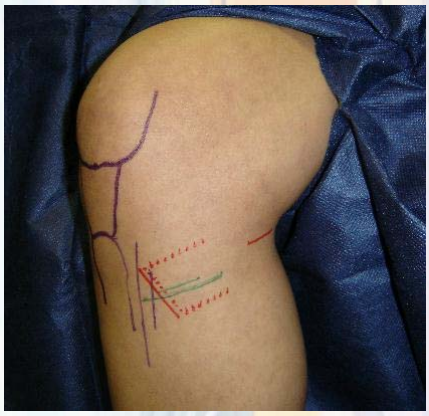
Significant hamstring deficits have not been generally reported, and orthopaedic literature has a significant number of papers suggesting that harvesting the hamstrings is without significant clinical consequences.

Possible causes could be:

- the action of synergistic muscles
- body adaptation
- restitution or regeneration of severed muscle units
- surgeon/observer bias
- other unknown or perhaps unrecognized factors

### HARVESTING HAMSTRING TENDONS

Harvesting hamstring tendons is not without technical difficulties. Consequently, multiple surgical techniques advocate incisions of different lenghts, directions ADN locations. Some examples are illustrated below:



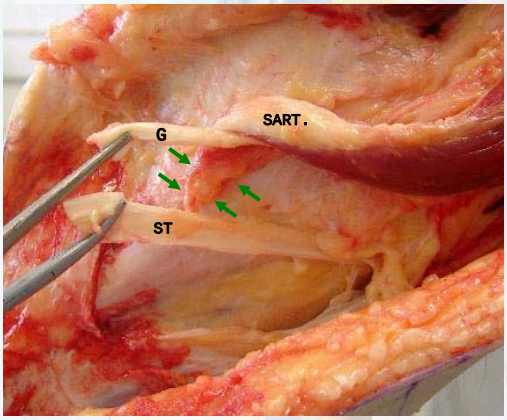
## HOW CAN THE DAMAGE TO THE SARTORIUS TIBIAL INSERTION BE MINIMIZED DURING HARVESTING OF THE HAMSTINGS TENDONS?

### HARVESTING ST ALONE

This generous vertical incision gives excellent exposure. The overlying Sartorius fascia-like tibial insertion is transversely incised along its fibbers. ST alone is harvested, and the overlying Sartorius insertion/fascia are sutured as far as possible.

Through a mini antero-medial incision, ST is harvested. Sometimes the GT insertion is also severed. When this happens, it is stapled back in place. No suture repair of the defect created in the pes anserinus is performed.

If the hamstrings are harvested in this "practical" but somewhat reckless way, most likely the sartorius insertion will also be significantly damaged. In this cadaver specimen, a mini-vertical incision was performed and the "ST-G" insertions located. The incision was then enlarged, the tendons harvested and the dissection extended further, in order to evaluate the potential damage to the sartorius tendon. In this case the tendon was found also completely detached from the tibia (arrows).




### THE TRANSVERSE INCISION

In this case, a transverse incision was performed by the author. ST alone is harvested, including the anterior strip of (tough) contiguous medial tibial periosteum. This allows a gain of about 2 cm of additional harvested tendon length. A defect of the same size is created in the pes anserinus tibial insertion. The overlying Sartorius fascia is closed as much as possible distally.

**Advantages:** Proximal identification of the underlying ST and GT tendons is facilitated, which we find especially useful if one aims for an isolated ST harvest. The localization and division of the accessory ST tendon is easier. Iatrogenic injury to the accessory saphenous nerve may be minimized. Cosmetics may be improved.

**Disadvantages:** If the same incision is used for the tibial tunnel placement, one risks making the tibial tunnel too vertical. If combined with a unitunnel transtibial technique, it may be impossible to place the femoral tunnel in the recommended posterior position.

### REASONS FOR THE POPULAR OPTION TO HARVEST BOTH ST-G TENDONS MAY BE:

- Insecurity about graft length
- Conviction about the necessity to fill the bone tunnels completely
- Preference for rigid fixation impossible to perform with a shorter graft
- More recent double tunnel techniques are impossible to r[illegible]technique.

**The irony of "double" hamstrings harvest technique:**

One tendon may seem inadequate; two may be too much tissue. When double ST-G harvesting is done, there may be a surplus of irreplaceable biological material that is cut off and thrown to waste, a very dubious but openly advertised idea.

courtesy of J&J company.
Brochure on RigidFix ACL fixation technique

## CONCLUSIONS

Two points seem to be of general consensus:

1) No present surgical technique reproduces entirely the ACL function and,

2) The hamstring muscles are synergistic with the ACL. Therefore, it seems odd that in the process of repairing a ligament one would disable other structures that help in the function we are trying to re-establish. The damage to the Sartorius distal tendon insertion is virtually impossible to evaluate accurately in vivo due to the small surgical incisions currently used, but it does not seem to be a concern for most ACL surgeons using hamstrings.

From clinical observation and cadaver dissection, we believe the Sartorius tibial insertion is frequently severed or at least disrupted during the process of harvesting the hamstrings, potentially disabling the entire pes anserinus tendon complex.

Further investigation into the effects of this harvest is necessary. As long as it remains an unresolved issue, we feel it is good judgement to minimize injury to the involved structures through use of the optimal surgical technique.

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