

POSITIONING the Extremity for KNEE ARTHROSCOPY

- J. DINIS CARMO, MD -

INTRODUCTION

Arthroscopy is a fine art. Like all fine arts its performance and final results are dependent of an array of small details. The first of those may be the way the lower limbs are positioned on (or out) of the table. As arthroscopy is getting "older", it is our feeling, from our visits to several world leading centres, that details which constitute the "back-bone" of the art are frequently overlooked, especially by new practitioners. And yet, as new and more sophisticated arthroscopy techniques are constantly being developed, increasing attention to detail is needed, in order to be able to successfully accomplish those demanding techniques- what starts wrong very likely will end up right. Therefore, the routine position of the lower limb adopted by different experienced arthroscopic surgeons - including some opinion-leader and pioneers in the field - during the performance of arthroscopy was documented and compared, with the purpose to analyse the practical implications of the different routines and the potential advantages and disadvantages of each one.

(I) - Lower Limb in Extension along the Op. Table - "TABLE FLAT" position

ADVANTAGES:

- economy, simplicity, easiness of set-up
- good results when performed by experienced and physically fit surgeons

DISADVANTAGES:

- It may be difficult to open the joint enough to work atraumatically, especially in cases of less compliant knees and when great valgus is required. A good example is to be able to achieve and maintain enough valgus to treat a tear of the posterior horn of the medial meniscus (a most frequent lesion) without articular cartilage scuffing.
- Increased mobility/ decreased stability of the knee. This may be a problem, especially during the performance of arthroscopic techniques that require the knee to be steady, like the passage of transosseous guide wires, curettage of chondral lesions, microfracturing, etc.
- Most surgeons that use this technique work with an assistant, with the stressing and physically demanding task to hold the leg in position, replacing the lateral post. Therefore:
 - great experience and good physical shape of the surgical team are highly desirable.
 - (in less experienced hands) there is a potentially increased danger for:
 - insufficient diagnosis and deficient treatment of intra-articular lesions
 - iatrogenic articular scuffing
 - damage/breakage of instruments



- Dr. Pinto de Freitas, MD**
HPP hospitals, Porto, Portugal. 2004
- General anaesthesia
 - Tourniquet applied and INFLATED
 - NO lateral post or leg holder
 - **STANDING** Surgeon's Position:
 - STANDING alongside the table
 - One human assistant
 - 2 standard Entry Portals (I.-L. & I.-M.)
 - Entry Portals NOT infiltrated (with anaesthetic / vasoconstrictor agent)
 - Control of i.-artic. fluid pressure: assisted gravity plus manually air driven bag "pump"
 - Technique for stressing the knee into (a) VALGUS: knee flexion and manipulation. The assistant holds the position;
 - (b) VARUS: figure of 4 on the table
 - NO drains

(I) (b) "TABLE FLAT" with a LATERAL POST

ADVANTAGES:

- Basically, the lateral post offers a counterpressure stand, against which a valgization force can be exerted. Keeping the knee open to gain access to the internal compartment is facilitated. There is more room for instrumentation and less potential for iatrogenic cartilage lesions.

DISADVANTAGES:

- Limited control of the joint.
- If the post is not long enough the leg may "flex & slip" over it when stressing the knee into valgus.
- If unsupported, the limb tends to "slide away" during the "figure of four" position.

To overcome this, the leg can be passed over the post to the other side, under the sterile drapes, and varus applied (troublesome...)



Prof. Robert W. Jackson, M.D., F.R.C.S.C.
Baylor Institute, Dallas, Texas. July, 2003

a most practical and economical way to achieve padding of the metal bar is just to slide a few rolls of adhesive tape over it.

- General anaesthesia
- Tourniquet applied but inflated ONLY in case of troublesome bleeding
- Starting Surgeon's Position: SEATED at the side of the table
- One human assistant
- 2 standard Entry Portals (I.-L. & I.-M.)
- Entry Portals NOT infiltrated
- Control of i.-artic. fluid pressure: arthroscopic "pump"
- Technique for stressing the knee into (a) VALGUS: knee flexion and pressure against the lateral post
- (b) VARUS: figure 4 on the table
- NO drains

(I) (a) "TABLE FLAT" without ANY accessory Tools

(II) - Lower Limb in extension along the Op. Table - "TABLE FIXED" position, with use of a LEG HOLDER

ADVANTAGES:

- **EXCELLENT** access and stability to ALL knee compartments, anterior and posterior.
- Position of choice to work in the posterior compartments of the knee and to evaluate the patellar tracking.
- Surgeon's working position at will: standing, sitting or alternating between the two.

INCONVENIENTS:

- A human assistant or a mechanized leg positioning apparatus (very expensive...) is most often required for stressing the leg and keeping the proper positions required.
- The well leg must be supported and well protected, e.g. with a gynaecology type of leg holder or... the distal element of the op. table must be made of 2 individual parts, allowing abduction.

Do to its flexibility, excellent knee exposure and accessibility, this is the routine position adopted by most leading arthroscopists around the world.

(II) (a) "TABLE FIXED" - "standart"



Prof. Thomas Rosenberger, MD
TOSH Hospital, Salt Lake City, Utah, USA. 1999

WELL LEG

- supported
- elevated
- flexed 90°-110°
- generous padding
- w/ elastic stockinet

Very important note:

- To leave both legs dangling unsupported over the edge of the table causes stressful lumbar lordosis, and is the most certain way to turn a knee patient into a spinal one...
- General anaesthesia
- Tourniquet applied and INFLATED
- Knee Flexed to 90°
- Starting Surgeon's Position:
 - STANDING facing the Op. Leg
 - SEATED in case of ACL repair
- Use of human assistant(s)
- 3 routine Entry Portals (I.-L.; I.-M.; S.-L.)
- Entry Portals NOT infiltrated
- Control of intra-articular fluid pressure: GRAVITY system
- NO drains

(II) (b) "TABLE FIXED and EXTENDED" POSITION



Prof. Dr. Med. Jürgen Toft
Alpha Klinik, Munich, Germany. June, 2004

- General anaesthesia
- Knee Flexed: 90°-110°
- Tourniquet INFLATED
- Starting Surgeon's Pos.:
 - STANDING
 - SEATED i. ACL repair
- Use of one human assistant
- 2 standard Entry Portals
- Entry Portals NOT infiltrated
- Control of i.-artic. fluid pressure: GRAVITY system
- NO drains

Note:

- Mayo stand over the patient, to place most commonly used instruments within easy reach

□ For ACL repair the Leg Holder & table are tilted cephalad. Knee flexion can be increased without the foot touching the table, providing a more favourable angle for femoral transosseous wire passage.

(II) (c) - Lower Limb in 30-40° of Flexion along the Op. Table - "TABLE FLAT and KNEE FLEXED" position and use of a LEG HOLDER

ADVANTAGES:

Combines a Leg Holder with support of the foot on the table.

This combination allows for:

- Most effective control for stressing and keeping the joint into valgus, varus and rotation. Opening the posterior compartments is easier, e.g., the access to the posterior horn of the medial meniscus is much facilitated.
- Good stability, particularly important when performing advanced techniques
- By playing with the position of the limb stressed between the leg holder and the surface of the table, the leg can be manipulated and HELD in almost all desirable positions, similar to a commercial, (very expensive), mechanical positioner device.
- An assistant may be dispensed

DISADVANTAGES:

- Cost. Most commercial leg (thigh) holders are exorbitantly expensive...
- The leg holder may get in the way to some extent when working through the superior or posterior portals. (Attention, when using long trans-ossseous guide pins, e.g., for ACL repair)
- Patellar tracking cannot be evaluated without releasing the holder from underneath the sterile drapes (cumbersome) and dangling the leg over the edge of the table in order to be able to flex the knee to 90° without strain angulating forces.

NOTE: A commercial Leg (Thigh) Holder is used routinely by the majority of peer arthroscopists around the world.



Prof. Dr. Med. Niklaus F. Friederich
Kantonsspital Bruderholz
Basel / Switzerland
January, 2003

- General anaesthesia or spinal
- Tourniquet applied and INFLATED according to need (about 50%)
- Leg along the table, moderately elevated, with knee flexed + 30°-40°
- Starting Surgeon's Position: STANDING alongside the table
- One human assistant
- 2 standard Entry Portals (I.-L. & I.-M.)
- Entry Portals NOT infiltrated (with anaesthetic / vasoconstrictor agent)
- Control of intra-articular fluid pressure: arthroscopic "PUMP" (FMS)
- Technique for stressing the knee into (a) VALGUS: knee flexion, leg pulled out of the table and kept stressed against the lateral edge of the table
- (b) VARUS: figure of 4 on the table
- NO drains



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Oporto Medical Center, Porto, Portugal. 2008



The end of the table is dropped and the patient's position adjusted as illustrated. This facilitates the movement of the surgeon around the limb. Well leg positioned out of the table (to provide room to place the contralateral foot on the table) and supported on a stool.

Technique for stressing the knee into valgus: Same as described by Prof. N. Friederich. Counterpressure is provided by the rigid leg holder.

Technique for stressing the knee into varus: The leg is flexed in a figure of four and the foot rested on the contralateral side of the table (★). This provides a consistent varus stress due to the counterpressure exerted by the rigid leg holder.

AUTHOR'S PREFERENCE(S)

- Routinely, we use a variant of the "Table Fixed and Knee Flexed" position. It is our position of choice, e.g., in lesions of the posterior horn of the medial meniscus.
- For ACL repair: "Table Fixed and Extended" Position.
- For Patellofemoral pathology and complicated cases or knee arthrosis/ chondral lesions: "Table Fixed" position.

MOST FREQUENTLY WE CARRY OUR ARTHROSCOPIC ROUTINE AS FOLLOWS:

- General anaesthesia
- Tourniquet applied but SELDOM inflated, except for most cases of ACL repair
- Use of rigid Leg Holder of very LOW PROFILE
- Starting Surgeon's Position: STANDING alongside the table.
- SITTING for ACL repair
- Use of human assistant: optional
- 3 routine Entry Portals (Inf.-Lat.; Inf.-Med.; Sup.-Lat.)
- Entry Portals ALWAYS infiltrated with epineph./lidoc. mix.
- Control of intra-articular fluid pressure: arthroscopic "PUMP" (FMS) Inlet canula in sup.-lat. supplement. portal
- NO drains, except for ACL repairs (extra-articular)

CONCLUSIONS -

Although there are two basic positions: "TABLE FLAT" and "TABLE FIXED", variations are common regarding the following:

1. the exact positioning of both the injured and the well-leg
2. the inclination of the table and the thigh
3. the use of a lateral post, leg holder or no restraint
4. the position of the surgeon relative to the leg
5. the use or not of human assistants - none of the observed surgeons ever use a mechanized leg positioning apparatus

In spite of the fact that it has been in use for many years, probably by many, to the best of our knowledge, the

- a) TABLE FIXED and LEG FLEXED position, that we first observed in Switzerland performed by N. Friederich and the
- b) TABLE FIXED and EXTENDED position used by Jürgen Toft, has been seldom, if ever, specifically reported by those who use it.

We concluded that there is not a universal standard position adopted by all arthroscopic surgeons. Familiarity, practice, the facilities of the institution where the surgery is performed and pathology, all seem to play a significant role. The treatment of some types of pathology may be facilitated by the use of a particular technique. Being able to modify the set-up in accordance with the intra-op. findings is an advantage. Practical implications, both technical and also economical of these different variants of technique exist and must be taken into consideration by each individual arthroscopic surgeon according to his experience and environmental conditions.

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