Tomographic Study of the Arthroscopic Approaches to the Hip Joint

Joan C. Monllau, M.D., Ph.D., Albert Solano, M.D., Alfonso León, M.D., Ph.D., Pedro Hinarejos, M.D., Ph.D., and Jordi Ballester, M.D., Ph.D.

Purpose: The anatomic depth of the hip joint has long been one of the limiting factors in the development of arthroscopy of this particular joint. A major factor would seem to be variation in body size. The main purpose of this study was to quantify the distance between the joint and the skin in usual arthroscopic approaches. **Type of Study:** In vivo radiologic study using computed tomography. **Methods:** We studied the distance from the center of the acetabulum to the skin. The lines that we studied correspond to the paratrochanteric, the anterolateral, and anterior arthroscopic entry points. **Results:** Although notable differences exist from one individual to another, the average values of the aforementioned are 12.4 cm, 11.2 cm, and 9.8 cm, respectively. The distances of these portals are greater in women than in men ($P < .05$), and there is no statistically significant relationship to age. **Conclusions:** The results of the present work suggest that surgical tools needed for arthroscopy of the hip should be more than 16 cm long to guarantee performing hip arthroscopy comfortably in more that 95% of the population. **Key Words:** Arthroscopy—Hip—Surgical instrumentation—Portals—CT scan.

Researchers began to perform arthroscopy of the hip joint in the 1930s.[1,2] However, it has evolved less than arthroscopy in other joints, such as the shoulder or the knee.[3,4] The technical requirements of arthroscopic surgery of the hip and the anatomy of this particular joint have caused this slower development.

Several techniques have been suggested to improve access to the joint and working inside it. Eriksson et al.[5] first established the force necessary to distract the joint in anesthetized patients, thus allowing adequate visualization of the articular surfaces. Conversely,

do not affect the congruent articular surface
though many authors[8] use the supine position, G
al.[4] recommended a lateral decubitus positio
provides better visualization of the posteroinferi
of the joint. More recently, Takahashi and Yama
reported on the use of a flexible arthroscope
gions where observation with a conventiona
arthroscope is difficult.

The anatomy of the joint, the second limita
hip arthroscopy, has also been a focus of stud
hip can be approached through several arthro
because of the major
vicinity of the joint, a
ls is necessary to perfo

t itself has also been
tor by many authors.

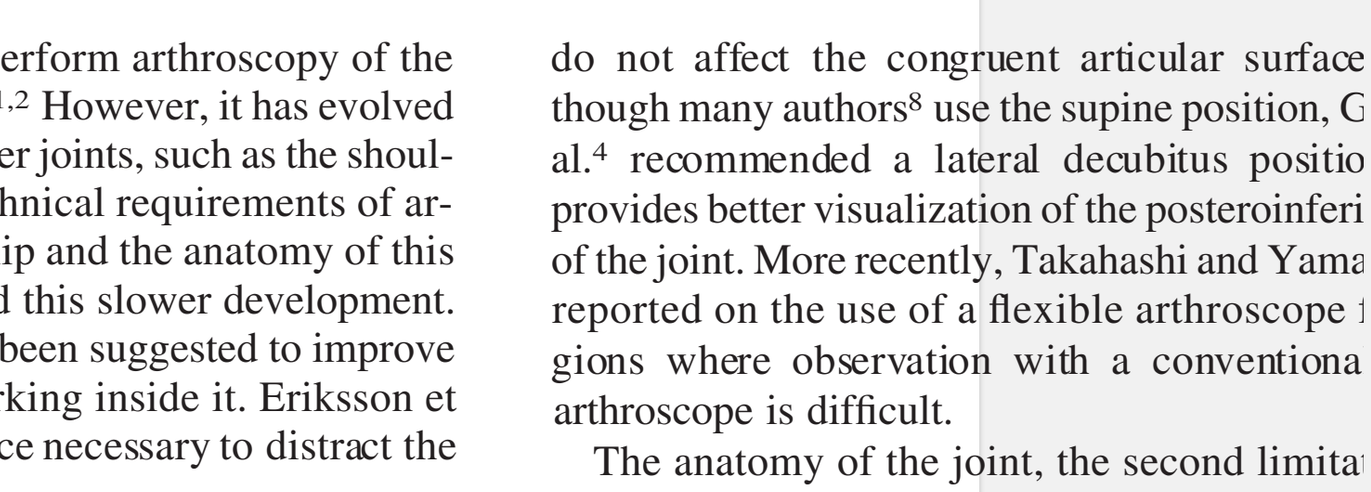
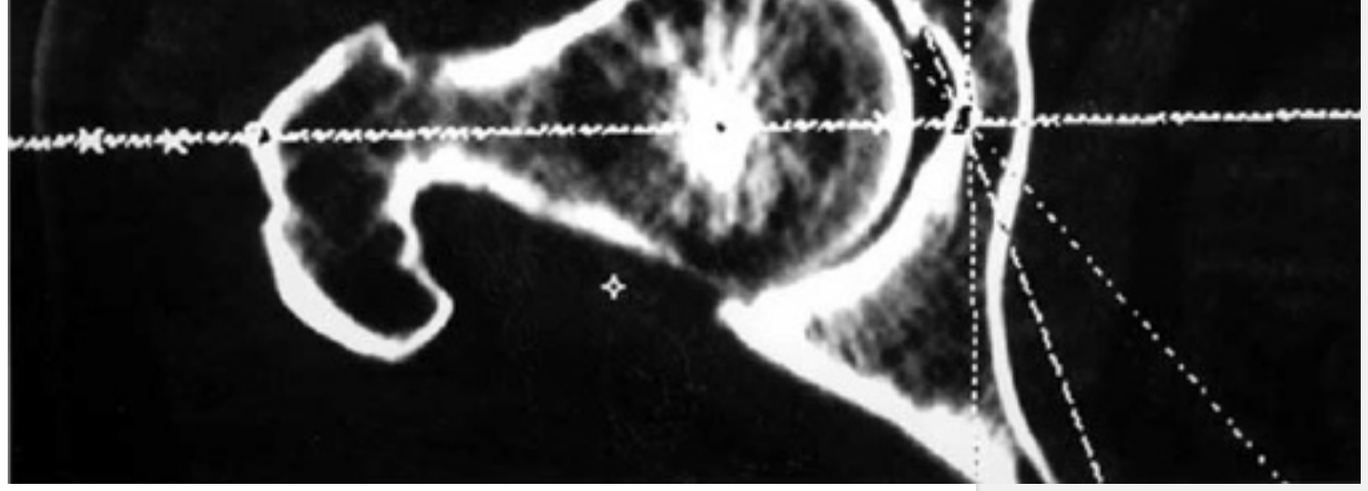


FIGURE 1. Measurement 1 is a horizontal line paralle to the floor plane (paratrochanteric approach). Line 90° is perpendicular to the horizontal line through the femoral vessels. Measurement 2 is a line 50°

from the horizontal (corresponding to the anterolateral arthroscopic approach). Measurement 3 is a line 70° from the horizontal (corresponding to the anterior arthroscopic approach).



are considered standard (anterior, anterolateral, and paratrochanteric).

METHODS

A prospective study was performed on a population of 100 volunteers who were chosen at random. The technical or human factors, were also excluded. All patients signed a release permitting the procedure to be performed. Subjects included comprised of 50 men and 50 women with the average age of 55 (range, 22 to 87 years).

Radiologic Technique

A tomographic study was performed with the volunteer in the supine position. From a preliminary "scout view," a cut level plane situated 5 mm superior to the tip of the greater trochanter was selected. To locate the selected approaches, 2 lines were drawn over the previously obtained images. The first line was parallel to the plane of the floor (0°) and is extended from the center of the acetabulum to the skin of the trochanter region. This line, or measure 1, corresponds to the trajectory of the paratrochanteric approach. The second line, perpendicular (90°) to the previous one, led to the groin skin and passes through the femoral vessels. Between both, we determine a quadrant of a circumference. Next, 2 new lines were drawn at 50° and 70° angles with respect to measure 1, called measures 2 and 3, respectively. They represent the anterolateral (50°) and anterior (70°) arthroscopic portals (Figs 1 and 2).

Once these reference lines were drawn for each of the patients in the study, a measure was taken of the distance from the skin to the acetabulum center with

criteria for inclusion in the study included the su having undergone a CT scan of the abdomin pelvic zones. We excluded subjects who had gone previous treatment of the hip joints or the bones. We did this to avoid possible radiologi facts or distortions of the anatomy of that zor tients with CT scans that were not good quality,

FIGURE 2. Operating the portals (anterior, ar eral, and paratrochanter in hip arthroscopy.

TABLE 1. *Average Distance and Minimal and Maximal Values of Each of the Measured Portals*

Portal	Average Distance	Standard Deviation	Minimal	Maximal
Paratrochanteric	12.41 cm	1.88 cm	8.97 cm	18.12 cm
Anterolateral	11.26 cm	1.50 cm	7.92 cm	15.06 cm
Anterior	9.80 cm	1.44 cm	6.52 cm	14.30 cm

TABLE 2. *Pearson's Correlation Coefficient Bet Measurements*

	Pearson's Co
Measurement 1–measurement 2	0.758
Measurement 1–measurement 3	0.565
Measurement 2–measurement 3	0.844

The statistical analysis was performed wi SPSS computer program for Windows (Mic Redmond, WA). The normality of the quant variables was assessed using the Kolmogorov nov test. The Student *t* test or, alternatively, ar of variance (ANOVA) for a mixed design was To compare measures of arthroscopic appro Pearson's correlation coefficient was also calcu Statistical significance was set at $P \leq .05$.

RESULTS

The average distance for the paratrochanter proach was 12.41 cm from the joint. The distan the anterolateral and the anterior portals were cm and 9.80 cm, respectively (Table 1). Accord the Pearson's correlation coefficient, there was degree of correlation among the 3 measurement ble 2).

Women showed higher values than men in the surements of the 3 arthroscopic approaches, alt the anterolateral measurement did not reach a s icant statistical level (Table 3). No significant tical differences between age groups were seen of the measurements related to the 3 approache ble 4).

DISCUSSION

the scanner. To minimize errors in the measurements, only 1 person was assigned to that task.

Triangulation is an important part of any a
scopic procedure. The particular anatomic featu
ding tissues make the
ortals more important t

perience, Keene and V
sible to observe the ent

lated to Sex

All
41 (1.88) cm
26 (1.50) cm
80 (1.44) cm