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1 Materials and Set-Up

1.1 Introduction

Arthroscopic exploration of the wrist has been practiced for decades, but the development of arthroscopic surgical techniques is relatively recent. The wrist is particularly mobile, with very little space between its constituent radiocarpal, midcarpal, and distal radioulnar joints. The aim of good set-up maintains joint position and produces axial traction to create sufficient space between the joints to pass instruments.

1.2 Materials

1.2.1 Arthroscopy Column

The arthroscopy column is the same for all transmitted surgery and includes a monitor, a video camera, and a light source. A compact camera head is the most adapted to the small camera used. Light sources fitted with a xenon or LED lamp are now progressively replacing halogen sources, giving better quality lighting and lasting longer. Additionally, image or video sequence recording devices are available for records, publication, or teaching.

Today's progress in light sources and recording technology allows the integration of a video camera, a light source, and video exporting into the same compact box.

The use of a printer is no longer necessary due to electronic exporting systems; however, immediate printing is still a simple method to show the patient the operation report and file a record in patient notes.

1.2.2 Arthroscope

A small arthroscope, between 1.9 and 2.7 mm, is usually used for the wrist, with a camera angulated at 30° (► Fig. 1.1). It must be short (60 to 80 mm) to adapt to the



Fig. 1.1 Arthroscope with camera angulated at 30°, sizes 1.9 mm, and 2.4 mm in diameter.

size of the wrist and depth of the surgery zone and avoid the clash of instruments outside the wrist. The sheath includes a connector for irrigation and the trocar must be blunt to avoid cartilage lesions.

1.2.3 Instruments

The instruments are also designed for precision and to limit the magnitude of external movements (► Video 1.1). The probe is the basic instrument for joint exploration. Fine instruments, such as graspers and resection forceps, are used. Angulated instruments can help access certain structures, which would otherwise be difficult due to the small joint intervals.

A motor is fitted with abrasive instruments, such as shavers or burrs of appropriate sizes: 2 to 3 mm in diameter and 6 to 8 cm long. Basic instruments include a knife, for synovial resection (aggressive cutter) and a burr, usually 3 mm, for bony resection.

A special electric bipolar diathermy machine is used for efficient tissue resection by vaporization. An irrigation system is used for joint cleaning and is absolutely necessary if using this system.

A canulated wide-bore needle is used for the passage of sutures and mini anchors are used for ligament repair. Specific instrument kits are available for more complex procedures such as triangular fibrocartilage complex (TFCC) reinsertion.

1.2.4 Traction

Arthroscopic approach to the wrist requires axial traction to separate the bones and create space for scope and instrument insertion. The traction applied is usually 5 to 7 kg, but can be only 2 to 3 kg for the thumb, for example.

It allows stabilization of the limb for surgery. The traction is vertical in the axis of the forearm with the arm fixed on the table horizontally, and the elbow at 90° flexion and the hand pointing upward. This traction can be



Video 1.1 Video presenting the different instruments useful for the realization of arthroscopy of the wrist.

Materials and Set-Up



Fig. 1.2 Set-up with vertical traction in "fishing rod" allowing the entire forearm to be free in the surgical field.



Fig. 1.3 Set-up using a traction tower.

Video 1.2 Video showing the use of the universal table that facilitates the installation of the wrist.

maintained using weights connected to a cable supported by stands, or sterilizable towers (► Fig. 1.2, ► Fig. 1.3). They allow orientation of the joint during arthroscopy.

Traction is applied to the hand using Chinese finger traps or a traction hand.

A new adapted table is now available, facilitating the installation (► Video 1.2).

1.2.5 Irrigation

Not all surgeons use irrigation; some prefer "dry arthroscopy." However, irrigation is frequently useful for cleaning the joint and is mandatory when using radiofrequency waves where the heat generated may cause burns. Irrigation in the wrist joint is not necessary for joint dilatation; this is maintained by traction. It is, therefore, possible to use low pressure, which limits the diffusion of saline into the tissues. The use of an arthropump is not necessary and is even discouraged: the pressure of 35 mmHg, used for wrist arthroscopy, can be obtained by simply raising the fluid pack 50 cm above the joint level. Irrigation inflow is through the sheath of the arthroscope.



A trocar is not necessary for outflow as evacuation of the saline occurs through the portals used. The suction provided by the shaver is used for joint cleaning. Constant rinsing of the joint gives better visualization and eliminates debris from intra-articular procedures, thus reducing the risk of infection. It also prevents tissue heating when using motor powered instruments and diathermy or vaporization. If there is no tourniquet, the irrigation limits bleeding by increasing intra-articular pressure. However, if not controlled, irrigation may cause infiltration of the surrounding tissues. Classically, arthroscopic exploration may be started using the "dry method," and irrigation may be used subsequently according to the view obtained, the procedure to be done, and the expected duration of surgery.

1.3 Set-Up

Arthroscopy is usually performed under regional block with a tourniquet on the distal arm close to the elbow, which is fixed to the arm table, preventing movement between the fixed area and the elbow during traction. Axillary block is the anesthesia of choice for wrist arthroscopy because it causes complete muscle relaxation, makes the tourniquet better tolerated, and ensures

postoperative analgesia; it also makes it possible to keep the hospital stay short. A tourniquet is usually used to obtain a bloodless field even though some authors now advocate arthroscopy under local anesthesia without a tourniquet.¹

The patient lies supine with the shoulder at 90° abduction. If a traction tower is used, it is placed on the arm table. The surgeon is at the head of the patient with the assistant beside or facing the surgeon. The arthroscopy column may be on the other side of the patient facing the surgeon, or sometimes facing the arm table (► Fig. 1.4). The image intensifier may be introduced from the distal side of the arm table, if needed, or facing the surgeon.

These positions may be swapped to adapt to different steps of the procedure.

1.4 Conclusion

Arthroscopic access to the wrist joint is particular due to its special anatomy characterized by small joint intervals. Adapted instruments and good setup enable safe surgery. Adequate time must be dedicated to proper setup, and appropriate instruments are mandatory for this surgery to go well.



Fig. 1.4 Diagram showing the position of the patient and the operators. The surgeon is at the head of the patient.

Reference

- [1] Ong MT, Ho PC, Wong CW, Cheng SH, Tse WL. Wrist arthroscopy under portal site local anesthesia (PSLA) without tourniquet. *J Wrist Surg.* 2012; 1(2):149–152

2 Surgical Approaches

2.1 Introduction

Arthroscopic surgery avoids the joint exposure that results from extensive surgical approaches. Conventional wrist surgery incisions are known to cause fibrosis and stiffness. Arthroscopic approaches are thus as small as possible. This chapter describes the main arthroscopic approaches, knowing that other possibilities exist, depending on the surgeon, the amount of exposure required, and variations in anatomic configuration.

2.2 General Principles of Approaches

The incisions are horizontal, following the skin creases and left to granulate to achieve an aesthetically pleasing scar. A no. 15 blade is used; no. 11 blades are used for other joints such as the shoulder or the hip, but not for the wrist where noble structures, such as tendons, vessels, and nerves, lie just beneath the skin and risk being damaged (► Fig. 2.1).

The steps for establishing an approach or portal are always as follow:

- Finger palpation of the zone
- Placement of a needle in the exact location of the portal, taking into account bony anatomy and the required angle
- Short incisions of 1 to 2 mm using the no. 15 blade
- Breaching of the skin and the capsule using a blunt mosquito clip to push away any noble structures without injuring them (► Video 2.1)

The dorsal radiocarpal portals are named for the dorsal extensor compartments they are between, so that portal 3–4 lies between the 3rd and 4th compartments and portal 6R is radial to the 6th compartment, and so on.

2.3 Radiocarpal Portals

The radiocarpal portals are named according to their positions in relation to the dorsal extensor compartments (► Fig. 2.2).

2.3.1 3–4 Radiocarpal Portal

This portal is the real key to wrist exploration and the easiest one to locate. The first method of location uses the three circles technique: a circle is drawn over the tubercle of Lister, two identical circles of the same size are marked distally and the portal is located at the center of the third circle (► Video 2.2). In the second technique, the thumb is held vertically against the wrist so that the pulp feels the tubercle of Lister and the tip is at the distal end of the tubercle, the thumb is rolled toward the distal end of the wrist, second phalanx of the thumb (P2)

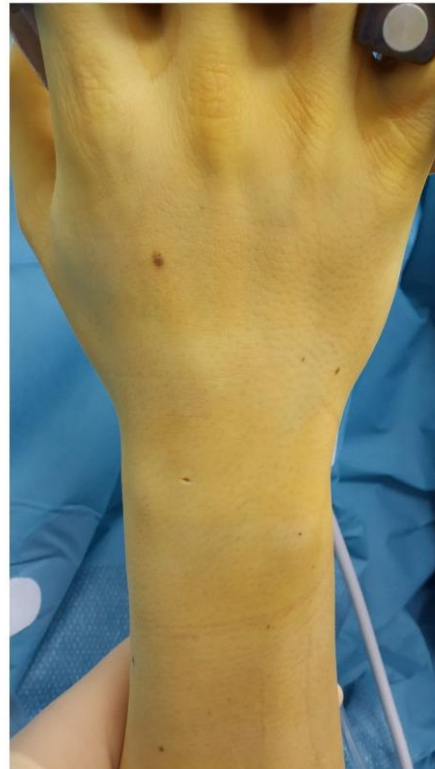


Fig. 2.1 Operative view of a 3–4 portal. The approach is a small horizontal skin incision allowing introduction of instruments and the scope.



Video 2.1 Video showing the sequence to establish an ulnar midcarpal portal (finger palpation, needle insertion, and introduction of the blunt clip followed by the arthroscope).