

MaxFire  
**MarXmen**  
MENISCAL REPAIR DEVICE



## Meniscal Repair

Surgical Technique by  
Keith Lawhorn, M.D.

**BIOMET**

## One Surgeon. One Patient.

**Over 1 million times per year, Biomet helps one surgeon provide personalized care to one patient.**

The science and art of medical care is to provide the right solution for each individual patient. This requires clinical mastery, a human connection between the surgeon and the patient, and the right tools for each situation.

At Biomet, we strive to view our work through the eyes of one surgeon and one patient. We treat every solution we provide as if it's meant for a family member.

Our approach to innovation creates real solutions that assist each surgeon in the delivery of durable personalized care to each patient, whether that solution requires a minimally invasive surgical technique, advanced biomaterials or a patient-matched implant.

**When one surgeon connects with one patient to provide personalized care, the promise of medicine is fulfilled.**

# The next generation of all-inside, all-suture meniscal repair



This material represents the surgical technique utilized by Keith Lawhorn, MD. Biomet does not practice medicine. The treating surgeon is responsible for determining the appropriate treatment, technique(s), and product(s) for each individual patient.

# ZipLoop TECHNOLOGY



ZipLoop Technology is a unique weave in which a single strand of braided polyethylene is woven through itself twice in opposite directions. This construct allows Biomet Sports Medicine to produce innovative products that can vary in length and compression/tension addressing the individual needs of each patient.



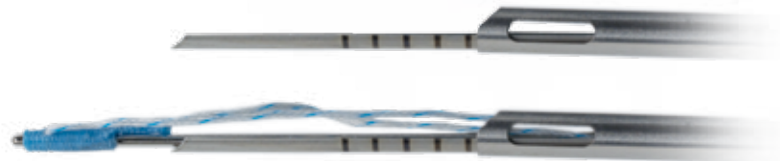
## Rigid Tube Cannula

- Helps protect the surrounding structures in the joint
- Houses the needle sled when the device is inserted into the joint space
- Available in curved and straight geometries



## Needle Sled

- Guides deployment path of MaxFire Device
- Depth markings in 2mm increments to control depth of penetration through the meniscus
- Blunt pusher wire deploys implant to the back side of the meniscus



## MaxFire Device

- All-suture implant
- Incorporates ZipLoop Technology—eliminating pre-tied knots near the articular surface of the knee



MaxFire  
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MENISCAL REPAIR DEVICE

**Depth Indicator**

- Provides a visual indication of the depth of needle sled penetration into the meniscus



**Thumb Wheel**

- Retracts cannula
- Controls the depth penetration of the needle sled



**Trigger**

- Allows one-handed deployment of the MaxFire device

# Surgical Technique



Figure 1

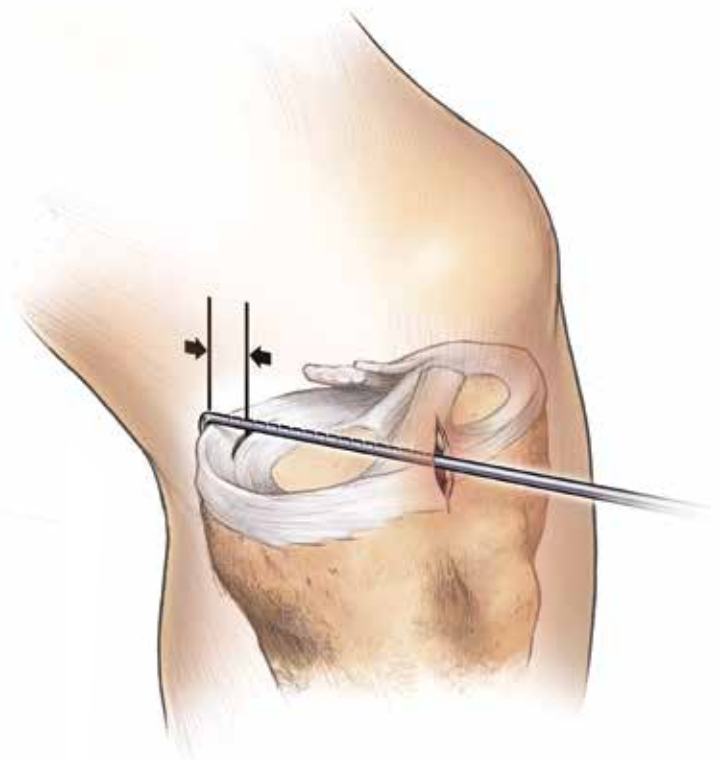


Figure 2

## Diagnostic Arthroscopy

Assess the location of the meniscal tear and determine the reparability of the lesion. Determine optimum medial portal placement using an 18-gauge spinal needle and direct arthroscopic visualization to create medial working portal. Optimum position is achieved when the needle enters just above the anterior medial meniscus parallel to the tibial joint surface (Figure 1).

Avoid placing the portal too superior. Ensure the medial portal is large enough to readily pass the inserter and suture cutter. Measure the distance from the back side of the meniscus to the desired needle penetration point at the repair site using a meniscal depth gauge (Figure 2).



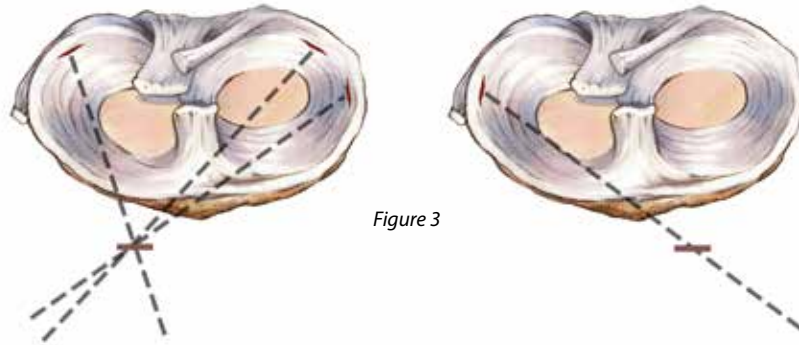


Figure 3

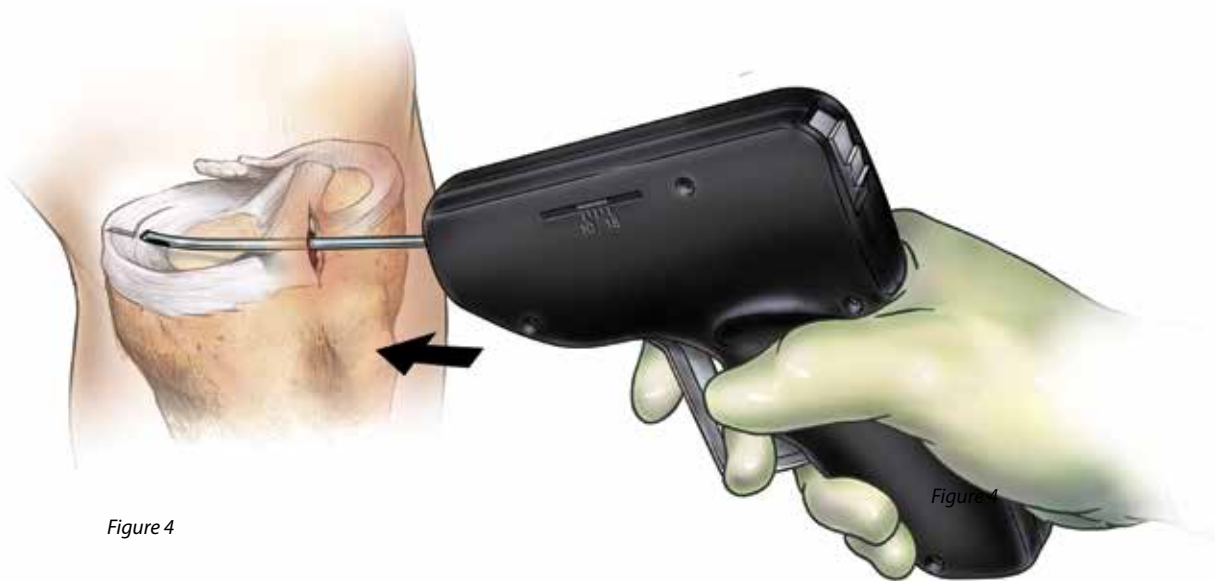


Figure 4

Figure 4

### Position the MaxFire MarXmen Inserter

Insert the disposable MaxFire MarXmen inserter into the joint. Both straight and curved-up cannulas are available to optimize implant positioning for repair. It is recommended that the straight version be used when approaching the tear from the contralateral portal and the curved version be used when approaching the tear from the ipsilateral portal. Use of a probe through the medial portal can help determine whether a straight or curved cannula would be optimal. To maximize safety, all posterior horn tears whether medial or lateral, should be approached from the medial portal.

Mid-body tears can be approached from the contralateral portal. Anterior horn tears can be approached from the ipsilateral portal (Figure 3). Under direct arthroscopic visualization, maneuver the cannula tip against, or adjacent to, the desired portion of the meniscus (Figure 4).

**Note: Avoid excessive torque of the cannula upon insertion into the joint.**

## Surgical Technique (continued)



Figure 5

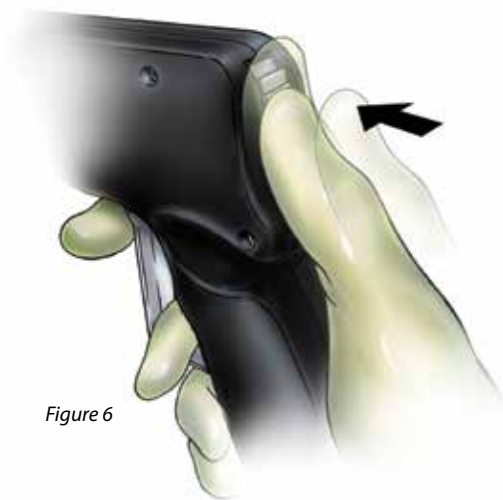


Figure 6

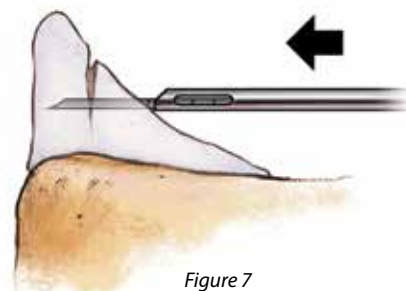


Figure 7

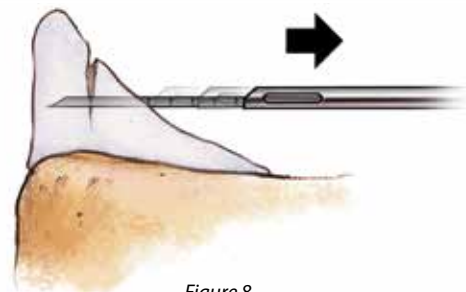


Figure 8

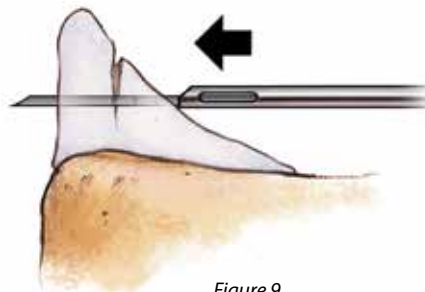


Figure 9

### Inserting Needle Sled

Place the long finger in the space between the trigger and the body of the inserter (Figure 5). Retract the cannula and expose the needle sled by pushing the thumb wheel (Figure 6). This will set the initial deployment length setting. **Note: Do not squeeze the trigger until the needle sled is in position to deploy the first anchor.** The needle deployment length is adjusted by rolling the thumb wheel.

Laser markings on the needle sled and a dial on the body of the inserter can be used to verify deployment depth. Each laser marking on the needle sled represents a 2mm increment. **Insert the needle sled into the desired location in the meniscus with the depth indicator set at 10mm** (Figure 7). Once the sled has been inserted into the meniscus, set the depth to the pre-determined setting (Figure 8) and advance the cannula until it is flush with the meniscus (Figure 9).



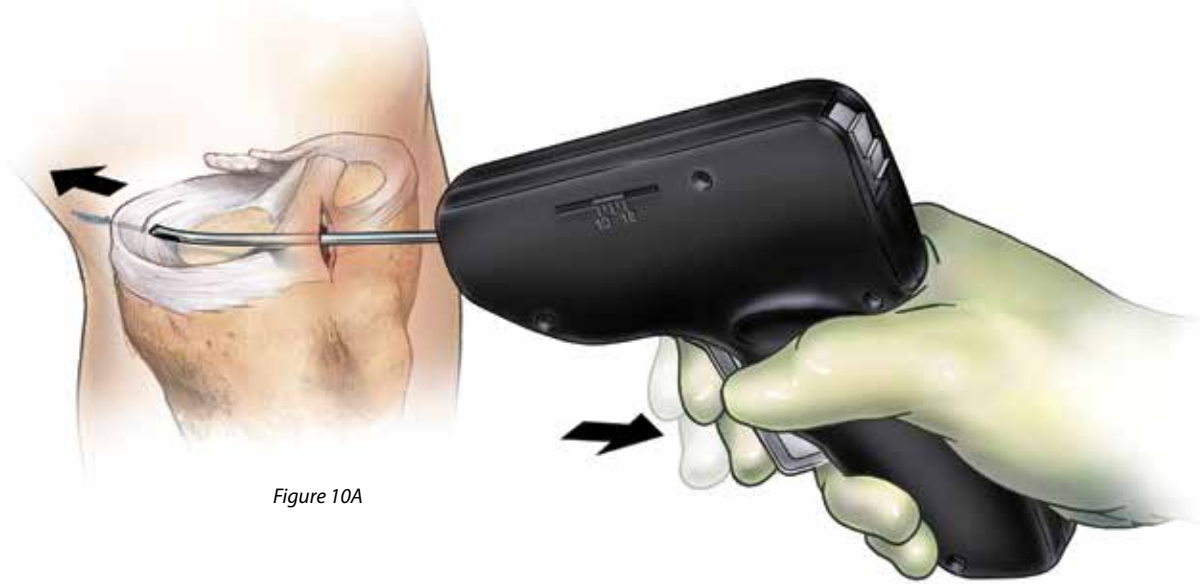


Figure 10A

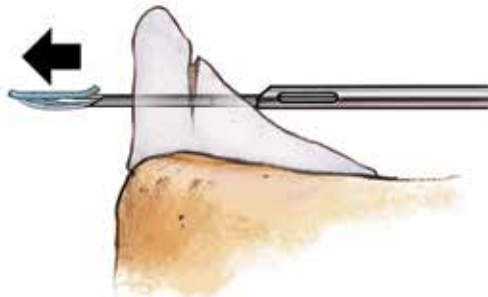


Figure 10B

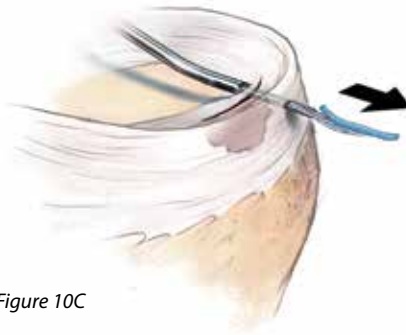


Figure 10C

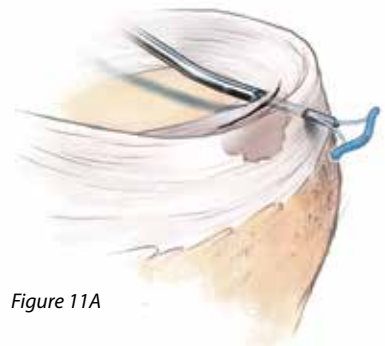


Figure 11A

### Deploy the First Anchor

Once the needle sled is advanced completely into the meniscus at the desired length, hold gentle but firm pressure against the meniscus. Position the middle finger over the outside of the trigger. Squeeze the trigger slowly and maintain pressure to deploy the implant (Figures 10 A, B & C). A gentle click will be felt once the implant has been completely advanced to the desired length. Release the trigger and pull the needle sled gently from the meniscus (Figures 11A & B).

**Note: Squeeze the trigger once completely for each anchor. Multiple trigger pulls (particularly with the insertion of the first anchor) will deploy both anchors at the same location.**

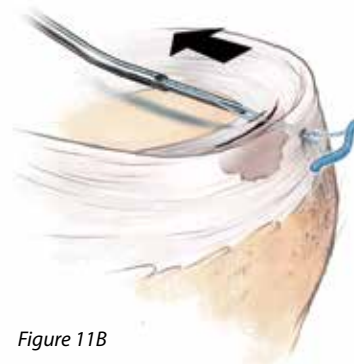


Figure 11B

## Surgical Technique (continued)

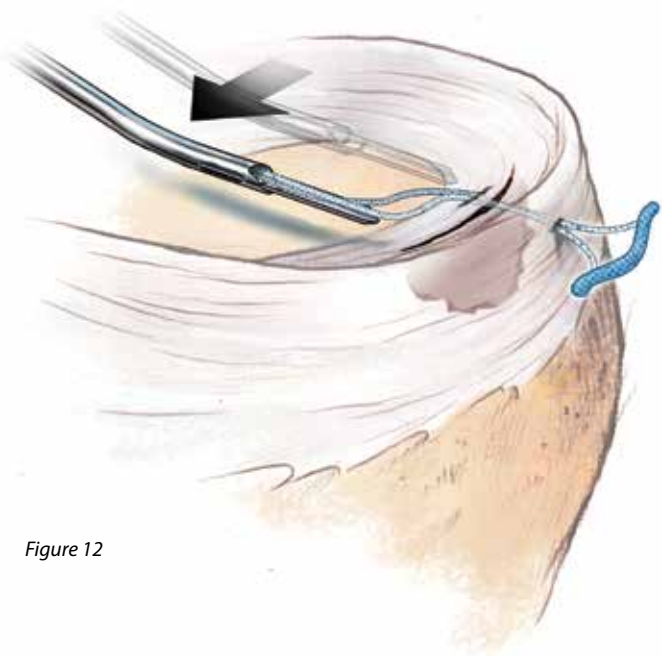


Figure 12

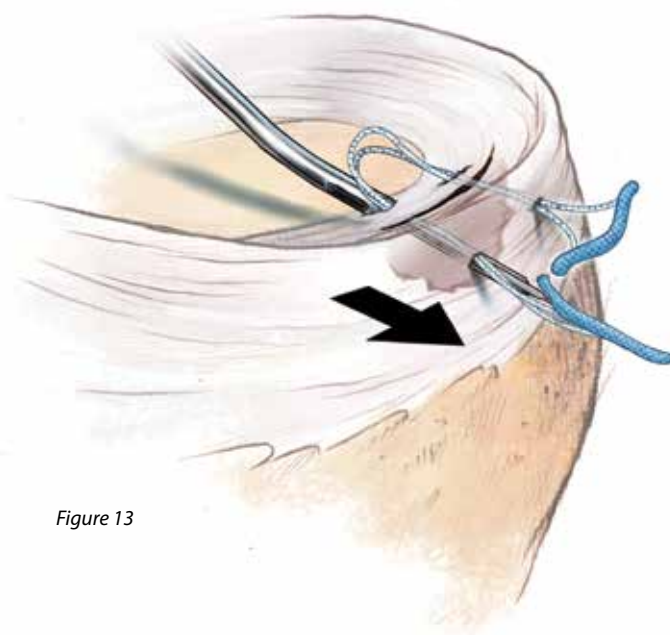


Figure 13

### Deploy the Second Anchor

Re-position the needle sled to a new desired location on the meniscus 5 – 10mm from the first anchor (Figure 12).

**Note: the needle sled may be retracted into the cannula while moving to new position if desired to prevent inadvertent chondral injury.** Return the long finger to the space between the trigger and the body of the inserter. Push the trigger outward to ensure it has returned to its original position. It is also important that the surgeon loads the second anchor appropriately by pushing the trigger out to its starting position after the first anchor is fired. This will ensure the second anchor is positioned correctly for deployment. Adjust depth of needle penetration to 10mm. Advance the needle sled into the meniscus in the desired location taking care not to impale the suture or damage the articular cartilage. This is particularly important when creating vertical mattress stitches.

Set depth to desired setting and advance needle sled into meniscus. Once the needle sled is advanced completely into the meniscus at the desired length, hold gentle but firm pressure against the meniscus. Squeeze the trigger and maintain pressure to deploy the implant (Figure 13). A gentle click will be felt once the implant has been completely advanced to the desired length.



Figure 14

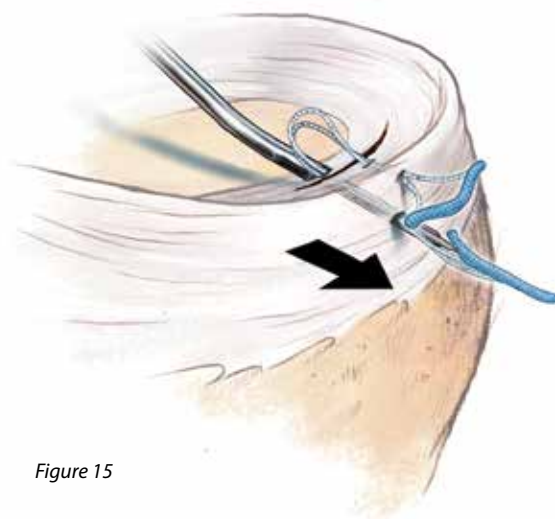


Figure 15

Release the trigger and pull the needle sled gently from the meniscus. Remove the MaxFire MarXmen inserter from joint (Figure 14).

**Vertical Mattress Technique:** Insert the first anchor on the superior meniscal rim or surface. Implants in this superior meniscal location will require shorter distances of deployment since the depth of meniscus will be less compared to the inferior meniscus. Insert the second anchor in the inferior meniscus. Needle depth penetration will need to be increased to ensure deployment of the anchor through the meniscus and capsule. (Figure 15).

## Surgical Technique



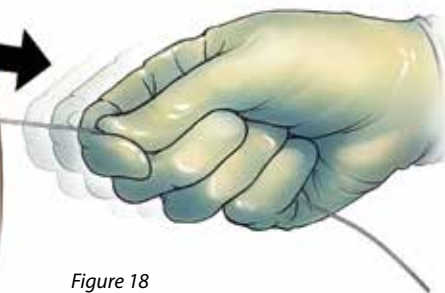
Figure 16



Figure 17



Figure 18



### Tension the Suture

A large loop and a free strand of suture will remain outside the portal site (Figure 16). Grab each of the loop strands leaving the single strand free. Pull on the strands to determine which strand tightens the inner short loop at the meniscus. **Note: Pulling the appropriate strand should NOT result in shortening of the single strand outside of the joint.** With the appropriate loop strand identified, alternately pull the appropriate loop strand and the single strand (Figure 17). Visualize tightening of the suture at the meniscal repair site. Once a small loop remains outside of the joint, simply pull the single strand until the second large loop is seated against the meniscal tissue balancing the two loops (Figure 18). A probe should be used to check the repair at this time.



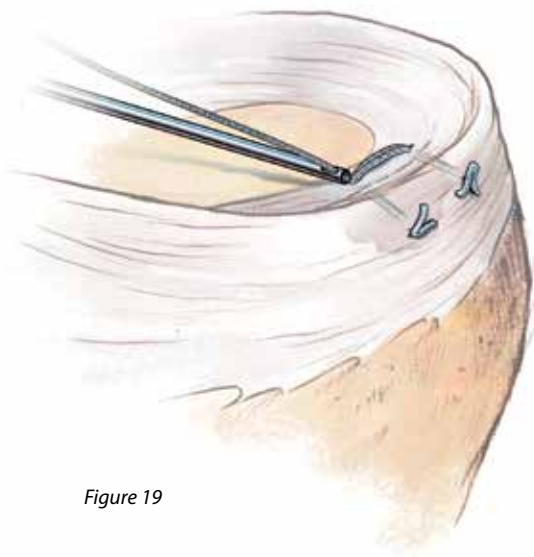


Figure 19

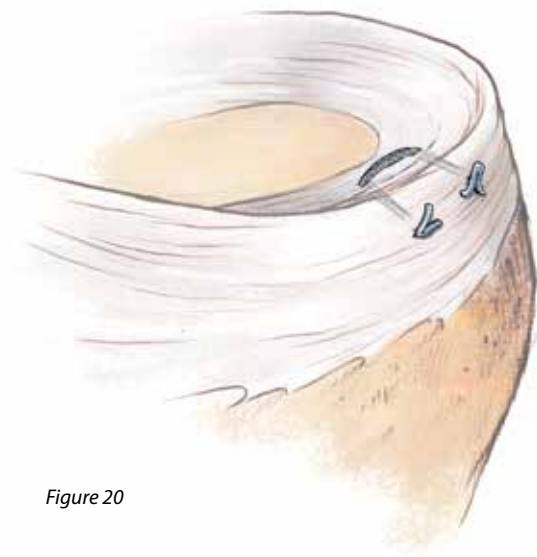


Figure 20

### Cut the Suture

Slide the suture into the opening of the disposable MaxCutter Suture Cutter. Insert the cutter through the portal and to the level of the meniscus. Advance the cutter lever to sever the suture (Figure 19). Fixation is now complete (Figure 20)

**Note: It is recommended that suture anchors from a given pair (single MaxFire construct) be spaced 5 – 10mm apart. Each MaxFire anchor construct should also be spaced 5 – 10mm apart to ensure subsequent anchors are not inserted into, or too close to, previously placed anchors.**

# Ordering Information

<b>MaxFire MarXmen Meniscal Repair Device with ZipLoop Technology</b>	
<b>900320</b>	<b>Straight</b>
<b>900321</b>	<b>Curved</b>

**Disposable Cutter**  
900325

**Calibrated Probe**  
905727

**Rasp**  
901011



## **INDICATIONS**

Biomet Sports Medicine MaxFire Meniscal Repair Device is indicated for the repair of vertical longitudinal full thickness tears (e.g. bucket-handle) in the red-red and red-white zones. These devices are not to be used for meniscal tears in the avascular zone of the meniscus.

## **CONTRAINDICATIONS**

1. Active infection.
2. Patients with mental or neurologic conditions who are unwilling or incapable of following postoperative care instructions.
3. Meniscal tears not suitable for repair because of the degree of damage (marked irregularity and complex tearing) to the meniscus body including degenerative, radial, horizontal cleavage and flap tears.

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