MultiZYTE®
Endoscopic Facet Joint Treatment Set

Product Usage Guide
Step by Step description of the endoscopic facet joint treatment
The endoscopic facet joint treatment

The term "facet syndrome" or „facet joint syndrome" was introduced in 1933 by Ghormley1. Shealy2 1970 proposed the use of percutaneous thermocoagulation for denervation of the facet joint. Based on this technique, Ray Charles and Nicolai Bogduk3, 4 developed the neurolysis of the medial branch with radio-frequency. Scientific evidence that pain emanating from the facet joints is successfully treated by eliminating the ramus medialis was provided by studies of Dreyfuss6. The endoscopically controlled facet joint denervation by radio-frequency is a method that promises long-lasting pain relief.

The individual vertebrae are interconnected dorsally by the facet or zygapophysial joints. Degeneration and/or inflammation of these joints can cause pain, which may be limited to the joint structures, but can also spread to the adjacent nerve roots in the back and into the thighs.

Beyond the denervation, the MultiZYTE® method provides the possibility to transect the ramus medialis dorsalis (medial branch nerve) and/or the mamillo accessory ligament (MAL) by use of scissors or punches under endoscopic control. Moreover, the inflamed facet joint capsule can be punctured, rinsed and pathological tissue can be removed. In addition, also hypertrophic tissue can be resected.

When degenerative changes in the facet joints and foraminal stenosis lead to a compression of spinal nerve roots, sometimes surgical intervention is necessary to achieve relief (e.g., with the TESSYS® method). In cases where the nerve root is not affected, the minimally invasive endoscopic facet joint denervation is a treatment option.7, 8

Due to our aging society, pain in the facet joints is an increasingly frequent diagnosis.

Facet joints are innervated by the medial branch of the dorsal primary rami above and below the joint. Each joint is supplied by two nerves that need to be ablated to gain pain relief at the joint. Each spinal nerve supplies two adjacent facet joints via the ramus dorsalis medialis. On its way from the dorsal root ganglion, the medial branch runs from ventral across the transverse process to the facet joints.9

An endoscopic approach to the facet joints is a truly minimally invasive method. Directly at the site of inflammation, an overview of the pain cause can be given and in the same session the treatment can be administered. With endoscopic visualization, often there is no need for additional expensive imaging techniques (MRI, CT) during the procedure. This treatment is a long-term blockade of pain-generating nerve fibers. If necessary, it may be readily repeated.
Application

**Indication**
- Chronic low back pain
- Facet joint hypertrophy
- Facet joint arthritis
- Post-discectomy syndrome
- Cervical spine trauma

**When is the endoscopic facet joint denervation recommended?**
- The patient has low back pain that has persisted for more than 6 weeks and has not responded to conservative treatment
- Palpation of the facet joint is painful and leads to muscle spasm
- The patient has limited mobility in the lumbar spine, especially when bending backwards
- A block of the facet joint or medial nerve branch confirms that the facet joint is the source of the pain

**Benefits of endoscopic facet joint treatment**
- Small incision, therefore hardly any scar tissue
- Long-term therapy success thanks to the endoscopically controlled procedure
- Effective and targeted treatment using radiofrequency ablation
- Transsection of MAL or medial branch nerve possible
- Treatment of joint capsule with irrigation and vaporization
- Resection of hypertrophic tissue possible
- Treatment at multiple levels possible with one incision
- Short recovery time
- Can be performed under local anesthesia
- Spinal mobility is preserved

MultiZYTE®

The MultiZYTE® Set can be used for several spinal diagnostic and therapeutic procedures. This includes periradicular therapy (PRT) and facet joint block. The kit components are optimally suited for the various interventions on the spine.

Any intervention on the spine, including the facet joint denervation, must first be assessed by a careful clinical diagnosis, magnetic resonance imaging (MRI) and/or computed tomography (CT), and various conventional X-ray images.

**Note:**
We recommend beginners to limit the use of the MultiZYTE® set to lumbar facet joints.

Preparation

**The following tools and components are required for this procedure**
- MultiZYTE® Instrument Set
- Multiscope combo or ocular
- Endoscopic equipment (e.g. joimax® Camsourse®, Vitegra®, Monitor, Versicon® Pump)
- Radio-frequency generator for joimax® probes (see page 12)
- Radio-frequency probe (Vaporflex® bipolar probe, Legato® monopolar or bipolar probe)
- joimax® patients isolation drape
- Marking pen
- joimax® Needle-Wire-Set
- Needles for local anesthesia, local anesthetic
- If necessary, X-ray contrast agent, indigo carmine (optional)
- Tubing set for irrigation pump
- Sterile rinsing solution for monopolar or bipolar treatment (see note on page 13)
- Camera cable cover
Positioning of the patient

Prone positioning
The patient lies prone on a radiolucent table. If necessary, a pillow for convenient positioning can be pushed under the belly. The positioning is optimal if the dorsal processes are centered in the AP fluoroscopy, between the pedicles. In this view, the facet joints are well displayed.

This is followed by disinfection and sterile draping of the patient’s back. With the image intensifier, the vertebral segments to be treated are displayed in two levels.

Anesthesia
The procedure can be performed under local anesthesia and concomitant sedation or general anesthesia. For more information, please refer to the joimax® anesthesia recommendation.

Access planning
Markings on the skin can simplify the positioning of the needles for convenient access and assist in proper placement. A sterile skin marker is used to mark the intervertebral disc space, the spinous processes, the lateral pedicular line, and the transverse process.

To uniquely identify the pain-causing joint(s), bilateral accesses can be necessary. For this purpose, a short-acting analgesic is successively applied via the needle. The joint is identified when the patient is pain-free after injection.
Access options

A variety of options is available for the access to the pathology:

**Option 1 – Access with 18G-Needle + Guide Wire (joimax® Needle-Wire-Set)**

The following pages describe the access option 1 in detail step-by-step.

**Access – Option 1**

The 18G-Needle is placed with its tip in the a.p. projection directly onto the base of the processus transversus. Simultaneously, the needle points to the height of the pedicle, lateral to the base of the posterior articular process.

For better orientation, the intertransverse ligament (between the transverse processes) can be stained with indigo carmine (see picture below). For this purpose, X-ray contrast agents and indigo carmine is injected through the needle. Indigo carmine is recognizable under endoscopic view.

If pain is caused mainly from arthritic facet joints, anesthetics mixed with/without contrast agent is indicated for injections into the facet joint (see picture below).

**Option 2 – Access with Guiding Rod**

4 working tubes depending on the application (see note on page 10)

Insertion of needle

For better orientation, the intertransverse ligament (between the transverse processes) can be stained with indigo carmine (see picture below). For this purpose, X-ray contrast agents and indigo carmine is injected through the needle. Indigo carmine is recognizable under endoscopic view.

If pain is caused mainly from arthritic facet joints, anesthetics mixed with/without contrast agent is indicated for injections into the facet joint (see picture below).

Instrument handle made of plastic (radiolucent) for fixing the needle and working tube during fluoroscopy (protect hands from exposure to radiation)
With different gripping tools (forceps), the loose tissue can be removed step-by-step. With the radio frequency probe (Vaporflex® oder Legato®), bleeding can be stopped and tissue is ablated and vaporized.

Facet joint treatment

The nerve branches run along the medio-cranial border of the transverse process, the lateral margin of the facet joint and are generally embedded in fatty tissue. The mamillo accessor ligament, which runs from the lateral aspect of the facet joint to the base of the transverse process, can serve as a point of orientation. With the nerve hook or the elevator, the nerve can be felt and seen endoscopically.

Note:
4 working tubes are offered in our MultiZYTE® Instrument Set. The different distal tube openings are adapted to the particular anatomical conditions and prevent the working tube from slipping off the transverse process.

For a good endoscopic view during the procedure, it is recommended to use an irrigation pump constantly. For better orientation on the endoscopic image, nerve elevations or hooks are inserted through the Multiscope.
joimax® radio frequency probes (monopolar and bipolar)

The joimax® RF probes (Vaporflex®, Legato®, monopolar and bipolar) are suitable for cutting, coagulation and devitalization of tissue and can be used with a suitable RF generator (e.g. joimax® Endovapor® 2). With the treatment of the facet joints, outstanding results can be achieved.

Utilization

The radio frequency probes are intended for use with the following RF/HF generators:

**Bipolar probes**
- joimax® Endovapor®
- joimax® Endovapor® 2
- elliquence SurgiMax®
- elliquence SurgiMax® Plus

**Monopolar probes**
- joimax® Endovapor® 2
- Erbe
- Valleylab
- Bowa
- KLS Martin

Note
For ordering information of the joimax® radiofrequency probes, see the joimax® data sheet “RF/HF Program – complete overview”. The handling details can be found in the operating instructions of either the bipolar or monopolar probe.

Recommendation for flushing
In order to ensure and maintain a constant purge flow, the use of an irrigation pump is recommended (e.g. joimax® Versicon®):
- Non-conductive irrigation fluid (e.g. Purisole®) when using the monopolar probe
- Conductive irrigation fluid (e.g. physiol. NaCl, Ringer etc.) when using the bipolar probe

**Endovapor® 2**
Multi Radio Frequency System
- Integrated spinal column surgery programs
- Bipolar and
- Monopolar
- All-in-one generator with interdisciplin ary application
- Arc regulator for safe operation
- Easy neutral electrode monitoring

Caution!
To avoid overheating the tissue and the probe, the probe should only be activated for short bursts of around 3 seconds, and the tube rinsed with sterile liquid in the intervals between vaporization. The vaporization bursts can be repeated multiple times. The probe should be moved forwards and backwards in the disc when active.
Treatment of the ramus medialis dorsalis

With the RF probes, the nerve is severed under endoscopic view and surrounding tissue is devitalized. The probes can also be used to stop bleeding, or for shrinking of tissue at the site of inflammation or swelling.

Note:
Repeat the process of denervation on each affected joint.

Up to 3 facet joints can be covered on one side with a single access point. In this case the surgeon selects the first access point from the middle joint to be treated. By cranial or caudal angulation/tipping of the working tube, the nerves of the upper and lower facet joints can be treated.

A swollen, inflamed facet joint can also be treated during this procedure. Through the endoscope, the joint can punctured, rinsed and / or arthritic bone structures are removed by means of forceps and cutting.

At the end of the procedure, the access is closed by a skin suture.

Additional methods of treatment

Nerve-Entrapping
(Bogduk et al., J Anat, 1982)
Nerve-entrapping of the Ramus dorsalis by the mamillo accessorly ligament (MAL, figure on page 11), the MAL can be severed under endoscopic control.

Transection of the MAL and/or branch of the dorsal nerve root
Using scissors or punches the MAL or medial branch of the dorsal nerve root can be cut under endoscopic control.

Treatment of hypertrophic facet joint
The facet joint can be treated under direct vision through the endoscope. This applies both to the bony and ligament structures (for example capsular tissue). For this purpose, forceps, punches, shaver blades and / or radio frequency probes can be used to ablate hypertrophied or inflamed tissue.

Puncture of the facet joint gap
In chronic irritation of the joint effusion may occur. A puncture of the facet joint gap and a treatment (rinsing, removal of pathological tissue) can be performed under endoscopic view.

ISG-treatment with MultiZYTE® SI
For the endoscopic minimally-invasive pain treatment of the sacroiliac joint syndrome (ISG), MultiZYTE® SI was developed. Denervation has been proven in various pathological changes of the ISG. Through gentle treatment, the mobility of the joint is preserved.

Warnings and precautions
joimax® GmbH is not responsible for complications or risks arising from:
> Incorrect diagnosis
> Selection of too high or too low energy settings
> Too long or too short activation time of the Vaporflex® and Legato® bipolar probes
> Insufficient sterile conditions
> Inappropriate patient considerations, e.g. positioning before, during and after the intervention

The application of the before mentioned products is permitted only by a surgeon familiar with this application and by today’s medical standards. joimax® offers its CM3 education program for this purpose.

See also the "Instruction for use" for each product applied.

Warranty conditions
Our warranty conditions are based on our General Terms & Conditions of Trade and the guarantees provided for each product.
List of literature

1. Ghormley, RK.; Low back pain with special reference to the articular facets, with presentation of an operative procedure. JAMA.1933;101:773
7. Data from Yeung et al. 2011, Vorstellung erster klinischer Ergebnisse von insgesamt 205 Patienten und einem Follow-Up im Zeitraum von 1 bis 3 Jahren auf dem ISASS Kongress 2011

Additional literature

> AWMF Online “Leitlinien der deutschen Gesellschaft für Neurochirurgie”
> Harms, Prof. Dr. J.; Informationsportal Wirbelsäulenkrankungen, www.harms-spinesurgery.com
> Siddigi et al.: Five Year Long-Term Results of Endoscopic Dorsal Ramus Rhizotomy and Anatomic Variations to the Painful Lumbar Facet Joint. Abstract; SMISS 2013
> A. Igressa, C. Charalampaki and I. Pechlivanis; Minimal Invasive Endoscopic Rhizotomy: a new Treatment for Lumbar Facet Syndrome – Technique and Clinical Experience; P 096 presented at IV WCMISST Paris 2014
> Reprinted from Bogduk N. The innervation of the lumbar spine. Spine, 1983; pg. 289