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Ultrasound guided application of HA in the soft tissues of the locomotor system in athletes – First experience

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❒ Summary

STABHA (Soft Tissue adapted Hyaluronic Acid) is highly purified hyaluronic acid – which is the first form to be applied periarticularly or intratendineously. The goal of this study was to find a new HA application opportunities, to demonstrate the positive effect of treatment and clarify its minimal side effects in so-far non-standard situations. The authors demonstrate new application possibilities and positive effects in treatment of soft tissues of the musculoskeletal system in athletes. HA is recommended for its minimal risk of negative side effects also in so far non-standard situations.

❒ Souhrn

Hrazdira, L., Pilecki, Z., Pilecki, G.: **Ultrazvukem řízená aplikace hyaluronové kyseliny do měkkých tkání pohybového aparátu u sportovce – první zkušenosti.**

Vysoce purifikovaná hyaluronová kyselina – STABHA je jako první aplikovatelná periartikulárně resp. intratendinózně. Práce prokazuje nové aplikační možnosti a pozitivní efekt v terapii měkkých tkání pohybového aparátu u sportovců. Autoři doporučují HA pro její minimální riziko vedlejších nežádoucích účinků i v zatím nestandardních situacích.

Introduction + Aim

Hyaluronic acid (HA), is a naturally occurring glycosaminoglycan, unsulfonated, linear polysaccharide composed of repeating units (D-glukuronic acid and N-acetyl-glucosamine). HA is one of the main components of extracellular matrix. It is part of the connective, epithelial, and neural tissues (2).

Biological functions of HA

- primary function is padding
- binds water (approximately thousand-fold)
- prevents transmission of viruses and bacteria through pericelular matrix to the cell
- has a significant regulatory and structural role in wound healing
  - moderates inflammation by inducing the release of cytokines and chemokines,
  - inactivates free oxygen radicals, affects cell proliferation and differentiation
  - promotes scar-free healing of soft tissues
- has an analgesic effect.

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Posttraumatic irritation of tibiofibular syndesmosis – 5 patients (1M, 4F)

is often visible when the leg moves to dorsiflection. The ankle syndesmosis comprises the anterior and posterior tibiofibular ligaments, the interosseous membrane and the transverse syndesmotic ligament. Patient with incomplete lesions usually have problems under load as well as in everyday activities and this injury is characterized by pain, reduced load-carrying capacity and a sharp drop in athletic performance. Rest in combination with plaster or orthosis fixation do not usually lead to a complete healing of the condition. HA significantly enhances the therapeutic procedures.

Achilles tendon tendinitis without structural change 3 patients(2M, 1F)

In tendinitis of the tendon HA is applied in those patients in whom ineffective previous standard conservative treatment brought no relief. There is no alteration of echostructure - the tendon is only fusiformly enlarged with a longitudinally arranged structure. In this situation HA is applied peritendineously and is used as a lubricant, which modulates inflammation and brings analgesic effect.

The tendon defects, whether resulting from cystic degenerative changes or from partial ruptures, require applications of HA under ultrasound control directly into the defect site. After application, we use appropriate rigid fixation or bandage for 6 weeks. In this case we utilize especially viscoelastic properties and mechanical support.

Acute partial rupture of the muscle with defect – 3 patients (2M 1F)

Intra and intermuscular hematoma is indicated for the treatment by HA. After ultrasound guided evacuation of hematoma SportVis is injected and combined with compression therapy and rest.

Encapsulated hematoma/seroma – 8 patients (3M, 5-F)

Fluid collection inside soft tissues is frequently found in more extensive damage to soft tissues injuries or after surgical resections. Here we apply HA in particular for its ability to bind water and padding performance. In these cases the authors use HA in combination with steroids – Depo-Medrol. Quantity applied depends on the size of the pathological formation. As a rule we apply SportVis with 0.5 - 1 ml of Depo-Medrol. In extensive affections we administer 2 syringes of SportVis + 1–2 ml of Depo-Medrol.

Bursitis – 3 patients (2M,1F)

Application of HA is combined again with discrete quantities of steroids. This therapy is used in the event when previous conservative treatment and steroid application alone remained without effect.

Symphysis irritation – 4 patients (3M, 1F)

It occurs when pelvic ring is injured by a direct trauma and it also develops by prolongated sacro-illiac blocs. The asymmetric position of pelvis leads to shearing forces on the buckle and its chronic irritation, especially during sports activities. As a result of irritation aseptic inflammation develops, with typical USG hypoechoic rim. Irritation persists even after removing the irritation cause and is resistant to allopathic therapy as well as to physiotherapy. In these patients SportVis by ultrasound guided injection is applied directly between pubic bones and the buckle is infiltrated with a very slow application.

Although the above effects of HA have been demonstrated and proved, HA is not commonly used in the treatment of musculoskeletal disorders. Its use is currently limited to intra-articular application for its lubricating and viscoelastic effect and in the last two years extra-articular indications for grade I to II ankle distorsions have been opened.

The goal of this study was to find a new HA application opportunities, to demonstrate the positive effect of treatment and clarify its minimal side effects in so-far non-standard situations.

Materials and methodology

In June 2008, a new form of HA, called STABHA™ (Soft Tissue adapted Hyaluronic Acid) was introduced under the commercial name *SportVis*. This is a highly purified hyaluronic acid with high purity and biocompatibility. This form is applicable into soft tissues for the first time either periarticularly or intratendinously. Periarticular hyaluronic acid creates the optimal environment for healing of damaged ligaments.

Inflammatory reactions occurring in the wound stimulate the synthesis of fibrin. HA creates a complex with fibrin fibers, which has the properties of porous, viscoelastic gel and provide mechanical support for ligaments. Furthermore, it regulates the migration of inflammatory cells, acts as analgesic, prevents collagen deposition and thus prevents tissue scarring. The result is accelerated healing and improved quality of healing.

- So far the only approved applications are for ankle sprain grade 1 to 2 and radial epicondylitis (4, 5).
- The authors applied STABHA™– (Sport Vis) under USG control (Volusson, probe-high resolution 7.5–16 MHz) to selected yet unproven sites.
- Patients were outpatient athletes in the sports orthopedics surgery. Indications for application of Sport Vis included a previous treatment failure, impossibility of application of another drug or effort to improve treatment (1, 3).

Results

- The **total number** of **evaluated patients was 51 (31 men, 20 women).**
- **Pain** after application (temporary during the 1st day) in **5 patients (1M, 4F).**
- **Other complications — general or local 0**.
- **Positive effect of treatment** (improvement) **46 patients (30M, 16F).**
- **Recurrence** of trouble after sporting activities **7 patients (4M, 3F).**
- **Combination** with steroids – **11 (5M, 6F).**
- **Failure of** therapy, **4 patients (2M, 2F), -** enthesopathy - 3 (2M, 2F) Bursitis 1 (1F).

Discussion

Acute ankle sprain grade III - 7 patients (4M, 3 F)

Complete ligament lesion of grade III (verified by evidence of instability in the examination in stress positions) has not been involved in the indication for SportVis. The authors' results are based on positive healing effects of HA on the reconstruction of ligaments and they combine administration of 1 injection of SportVis into the tarsal sinus and lege artis conservative treatment – rigid fixation for 6 weeks by plastic circular fixation or by by a suitable orthosis. All patients were successfully healed and no instability was found.

Patellar tendinitis – 4 patients (4M)

Patellar tendon overuse injuries are common because the patellar tendon is essential in almost all sporting activities. However, the results of conservative treatment are controversial HA applied intra or peritendineously is included as a part of comprehensive therapy.

Enthesopathy – 8 patients (5 M, 3F)

For its chronic nature we have to solve serious medical problem. It may take months or years even with adequate treatment. HA is used following the failure of other treatment modes linked to other particularly regimen measures.

Decollement injury – 1 patient (1F)

In some injuries the subcutaneous fat tissue is detached from the surface of the muscle (fascia). As a result, discrete quantities of transsudate appear between the two layers. 1 ampule of SportVis is gradually applied under USG control between both layers and the site is immediately compressed with an elastic bandage.

Conclusion

Stabha-SportVis – is registered as a medical device for acute as well as chronic disorders. This is why the therapeutic application is not limited by law on medicaments. Application of hyaluronic acid into the soft tissue is a safe therapeutic method. The authors demonstrate the minimal risk of complications, the overall toleration of the organism, no case of damage of the treated structure. This substance is not listed among the banned substances from the perspective of doping reports. They recommend this substance for broader applications for active athletes.

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