Stemcelltheraphy from bone marrow vs. fat tissue

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Cellular Basics

- Stemcells are undifferanciated cells, which are able to differenciate themselves into special tissue by replication and selfrenewing
- Adult mesenchymal pluripotent stemcells are in the bone marrow and in the fatty tissue
- In bone marrow are as well many growth factors
- The goal is to ensure tissue regeneration without scar formation
- Healed tissue has better biomechanical und structural abilities than scar tissue
Indications

- High suspensory insertion desmitis
- Flexor tendon tendinitis
- Desmitis of check ligament
- Desmitis of collateral ligaments at different joints
- Insertion desmitis of the spavin tendon
- Arthrosis in different joints
Instruments for bone marrow aspiration

- Sharp surgical knife
- Trokar with Obturator
- 5 Luer-Lock Syringes
- Anticoagulants (Natriumcitrat)
How to do bone marrow aspiration

- Tranquilize the horse with Detomidin and Butorphanol
- Cut through skin and muscles in the median line behind the elbow joint after local anesthesia of this region
- Insertion of the trokar by turning movements
- Release the obturator
- Slow aspiration of the bone marrow
- Filling of syringes prepared with anticoagulants (40-100 ml)
- Local injection of a part of the sample and sending the rest to the laboratory for cultivating
Preparation of the patient
Sternal punkture I
Sternal punkture II
Local injection of bone marrow
aftercare

Topical spray closure

bandage of treated area
Advantage

- No adverse reactions against autologous stemcells
- Growth factors
- Low cost procedure
- More expensive if culture of the cells is needed
Risk factors

Puncture of the pleura or heart

Hyperreaction at injection area with serious pain

Anaphylactic shock reaction

Infection
Cellculture

- After adding 20 % Citratsolution as an anticoagualnt around 100cc of the aspirated bone marrow is sent to the lab in stabilsed temperatur between +2°C und 8°C
- Culturing over 3-5 weeks
- Cultered cells are suspended in 5 cc NaCL or serum of the host animal
Injection of the cultivated stemmcells

- Ultrasound guided
- Aseptic injection side
- Intralesional injection
- Sterile padding
Stemcells from fat tissue

- Quality in the tail area is better than the neck
- More mesenchymal stem cells than in bone marrow
- Higher purity of the initial isolate
- Easy and risk free collecting
- No growth factors
- Treatment after cultivating (Around 2 weeks)
Treatment for Tendon Injuries in human medicine (Dr. Müller-Wohlfahrt, München)

- Local Infiltrations
- Mepivacain, Traumeel, Heparin,
- Medivitan, Actovegin, Zeel, Coenzym
- Stimulation of the healing process
Cell culture of stem cells

After 4 days fat culture  bone marrow culture
Cell culture of stem cells

After 10 days fat culture  bone marrow culture
10 horses monitored (n=10)

- Dressage and jumping horses with similar
- High suspensory lesions
Cases with High Suspensory lesions

- 6 dressage and 4 jumping horses with similar lesions
- 3 dressage and 2 jumping horses are treated with fat cultivated stem cells and with an initial injection of activating agents
- 3 dressage and 2 jumping horses are treated with bone marrow and cultivation of that
Case I  stemcells from fat tissue
Dressagehorse

initial  after 2 weeks  after 2 months
Case II  bone marrow stem cells

High Suspensory lesion, dressagehorse

initial  after 2 weeks  after 2 months
Case III  Jumping horse
fat tissue stem cells High suspensory desmitis

Z1A  initial  Z1B  Z2A
Case III after 2 weeks
Case III - after 2 months
High Suspensory lesion, Jumping horse
Case IV bone marrow stem cells
High suspensory, jumping horse

initial  After 2 weeks  after 4 weeks  after 8 weeks
Results

- Success rate more than 80% in tendon lesions
- Improvement of the healed structures in ultrasound controls
- Improvement of clinical signs
- 8 of 10 horses are stable, from each group one horse did fail
- No different results between bone marrow and fat cultivated stem cells

- Multiplicated action of stem cells and growth factors with bone marrow injection
Conclusion

- Advantage of the better growing of fat cultured stemcells seems to compensate the advantage of the growth factors in bone marrow injection
- Faster treatment gives better healing results
Improved therapy

- Bone marrow aspiration and injection
- Fat tissue use for cultivating of the stemcells
Thank You for Your attention