Surgical Therapy of Pectoralis major Rupture

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Purpose

- Pectoralis major rupture is not very common, only 300 cases are documented in the literature.
- Surgical therapy is judged differently
- Which results are achieved by surgical therapy compared with conservative treatment? Which factors are influencing the results?
Objectives

- mechanism of injury
- location of rupture
- size of rupture
- conservative vs operative treatment
- time of operation
- acute/chronic rupture
- demand of the athlete
Anatomy
M. Pectoralis major

Clavicular portion
Line of separation
Sternocostal portion
Rotated fibers of sternocostal portion

Jobe u. Coen in Rockwood et al. 2004
Methods: Patient selection

- 105 Pectoralis major Ruptures in 92 patients
- 1997-2008, Follow up > 1 Jahr
- all male, 52 right side
- 101 Power athletes (96 Bodybuilding, 5 Powerlifting)
- 7 ruptures on both sides at different time
- 6 Reruptures
Methods: Demographics

- age $\varnothing$ 34.3 years (16-53)
- height $\varnothing$ 180 cm (167-205)
- weight $\varnothing$ 105 Kg (74-148)
- period of training 14.1 years (3-29)
- 4.1 times / week (3-6)
Methods: Diagnostics

- clinical aspect
- „shape sign“
- Ultrasound
- MRI
MRI

Same patient

Ultrasound
clinical aspect

„Shape sign“ loss of the shape of lateral aspect of the pectoralis in the 90° ABD arm in case of rupture
Clinical aspect: Location of the rupture

pars sternalis still intact

rupture
MRI and Ultrasound of the same patient in an acute rupture. The advantage of the ultrasound is the functional investigation in a abducted position. This shows reliable the size of the rupture. In the MRI the position of the shoulder is always adducted. The size of the rupture is so more difficult to see.
Methods: Demographics

- **age**: $\phi$ 34.3 years (16-53)
- **height**: $\phi$ 180 cm (167-205)
- **weight**: $\phi$ 105 Kg (74-148)
- **period of training**: 14.1 years (3-29)
- **4.1 times / week**: (3-6)
Methods: Mechanism of injury

- 82/105 bench pressing
- 5 ruptures in other Weight training exercises: Flys, Dips, power clean
- 4 in other sports: Gymnastics, Jiu-Jitzu, Boxing, Ringen, Wrestling
- 8 fall on the abducted arm: motortorcycle, bicycle, Skiing, Football, tree, ladder
- 3 forcible IRO: arm wrestling
- 3 without definitive trauma
Methods: Location

- 77 myotendinous junction, 17 tendon, 11 muscle
- 3 complete, 102 incomplete
- Pars sternocostalis most time
- 24 alone, 67 x together with the pars abdominalis, 5 x with pars clavicul.
- 6 pars abdominalis alone
Methods: Time of Operation

- 64/105 OP
- 27 primary – within 2 weeks after trauma
- 10 postprimary – 2-6 weeks
- 27 chronic – more than 6 weeks
- 7 of the 27 chronic had prior operation
Methods: Operation - Technique

- scin incision a little medial to the sulcus deltoideopectoralis in the cleavage lines!
- clearing up the hematoma
- mobilizing the tendon and the muscle
- matress sutures with Orthocord and Vicryl from the tendon stump to the muscle
- suture anchors if necessary (only in 8 cases)
- tie down the sutures in shoulder ADD
- Redon drainge, suture of the fascia
Methods: Operation - Aftercare

- 6 weeks immobilisation in a sling
- 6 weeks no shoulder mobilisation
- from the 7th week starting mobilisation with increase full range of motion except ARO in ABD and for 6 weeks without any weight bearing
- from the 13th week increase weight bearing and starting specific training
Results

- 37 primary, postprimary
  - 37 good and very good
  - 32 prior level of strength

- 27 chronic (incl 5 Reruptures)
  - 10 good, 10 satisfied, 7 poor
  - 12 prior level of strength

- all have free range of motion, no pain, free function, no reduction in ADL, no cramps, all results are stable in the follow up
Results - Complications

- operative 5/64
- 2 small wound disorders
- 2 postoperative Hematoma with Revision
- 1 MRSE Infect with several Revisions and VAC
- 5 Reruptures: 2 new trauma, all renew OP
Discussion

- n=17, 10 weight lifting/8 Bench pressing
- 13 Operation(6 acute, 7 chronic > 2 weeks)
- subjektive Satisfaction 96% acut, 93% chronic, 51% in the non-operative group
- Isokinetic - Adduction strength - acut 102%, chronic 94%, non-operative 71%

- n= 33 OP comparison with Metaanalysis
- both series - best outcome in early operative therapy
- delayed operation better outcome than conservative treatment

Schepsis et al. 2000

Ääriema et. 2004
Discussion

- Location – only 17/105 were tendon injuries, the most common location was at the myotendinous junction
- The complete rupture is in contrast to the literature rare, only in 3 of 105 cases complete
- There is no established score to measure the outcome
- Isokinetic is very helpful to determine the strength postoperative, but the most of the injured athletes do bench pressing. In these cases the maximum weight shows perfect the strength outcome postoperative in contrast to preop.
Pectoralis major Rupture - conclusion

- the early correct Diagnosis is very important
- the function and the ADL are although without operation good, but there is a strength deficite
- in concord with the literature the early acute operation leads always to good and excellent results
- in the chronic cases the results are not so good like the acute cases, but there is an improvement in most of the cases.
- The location and the size of the pectoralis major rupture doesn`t influence the postop. results
Pectoralis major Rupture - conclusion

- in clinical diagnostics the „shape sign“ is very helpful
- MRI and Ultrasoud shows both the size and location of the rupture. The advantage of the ultrasound is the functional investigation in a abducted position. This shows reliable the size of the rupture. In the MRI the position of the shoulder is alwys adducted. The size of the rupture is so more difficult to determinate.
Pectoralis major Rupture

„The acute operation had an significant better outcome as conservative treatment or delayed operation. Age and location doesn`t influence the results.“

(Bak et al. 2000)
Pectoralis major Rupture

The early accurate diagnostics and following anatomical reconstruction of the pectoralis major improve the results in every aspect. There is always a indication for reconstruction of the pectoralis major in an acute injury in every weight training athlet. The most negative influence on the results is an delay in time.
thanks