SCAPULA ALATA
OR
WINGING SCAPULA

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Since 1837 when Scapula Alata "Winging Scapula" was mentioned for the first time in literature several treatment methods have been tried. Still no treatment concept has been determined for this diagnose.

Since 1992 physiotherapists at Viborg Hospital have worked with the development of a treatment concept for this group of patients, and we have diagnosed approximately 25 new cases annually. Among other things we have developed a brace in collaboration with shoulder surgeons and orthotists. Furthermore we have developed a method for examination and analysis of the dysfunction around scapula and also a method for the physiotherapeutic rehabilitation.

In 2002/2003 we made a study of the effect of treatment of 64 patients. It tells us that after an average of eleven months of treatment 61 patients had returned to their former jobs or sports activities (Ugeskrift for laeger - 21. april 2003, nr. 17). For this reason we can conclude that we at Viborg Hospital have a highly effective treatment concept for this group of patients.

From April to June 2006 we made a new study. In this study we decided to look at other parameters than the length and effect of treatment. The study consisted of 147 patients suffering from winging scapula. In 94 cases an EMG/ENG measured and pointed out an affection of m. serratus anterior and/or n. thoracicus longus.

The following is the case for these 94 patients:

Dispersion of gender:	Predominance of men compared with women (2:1)
Side-affection:	Predominance of right-sided compared to left-sided (6:1)
Dominant side:	We have only registered this in 36 cases. The spreading was 5:1 (right/left)
Geographical dispersion:	See the map – appendix
Age:	The average age was 37,36 years (the youngest was 16 years old, the oldest was 68 years old)
Brace:	85 percent of the patients were provided with a brace
Length of treatment:	The average time of treatment was eleven months
Number of treatments:	The average number of treatments was 10,65, including a start- and a final check-up at the doctor's
Cause:	The cause of winging scapula was spontaneously or traumatically arisen

The cause of a Winging Scapula is an influence of n. thoracicus longus resulting in a reduced function of m. serratus anterior. Clinically it shows by margo medialis winging to a higher or lesser extent when elevating the arm. Often you see an altered position of rest of the affected scapula compared to both the opposite side and to the most functional and optimal placing. The patient will experience different kinds of difficulties. It can be all from tiredness in the arm to disabling pains, reduced strength, more or less restriction of movement, and also radiating symptoms from the nerves involved.

Winging Scapula

The purpose of the brace is to re-establish the normal position of rest and also prevent margo medialis from winging when moved. It is worn when the patient actively uses the affected arm. In addition to that the patient is given an introduction to a very specific training program adjusted individually to the patient. It consists of correction of posture, stretching and also training of stability and strength of relevant muscles. At regular intervals the patient consults the physiotherapist concerning correction and progression of training plus adjustment of the brace.

Brace

The nerve regenerates on its own but that does not mean that the muscles retrieve neither their normal position of rest nor their function on their own. Unfortunately it often turns out that the condition gets worse in the course of time. This is the result of the inappropriate position of rest which scapula assumes. In this position of rest the different muscles fixed on scapula are either in traction or too tightened. Hereby the scapulahumeral's rhythm is disturbed.

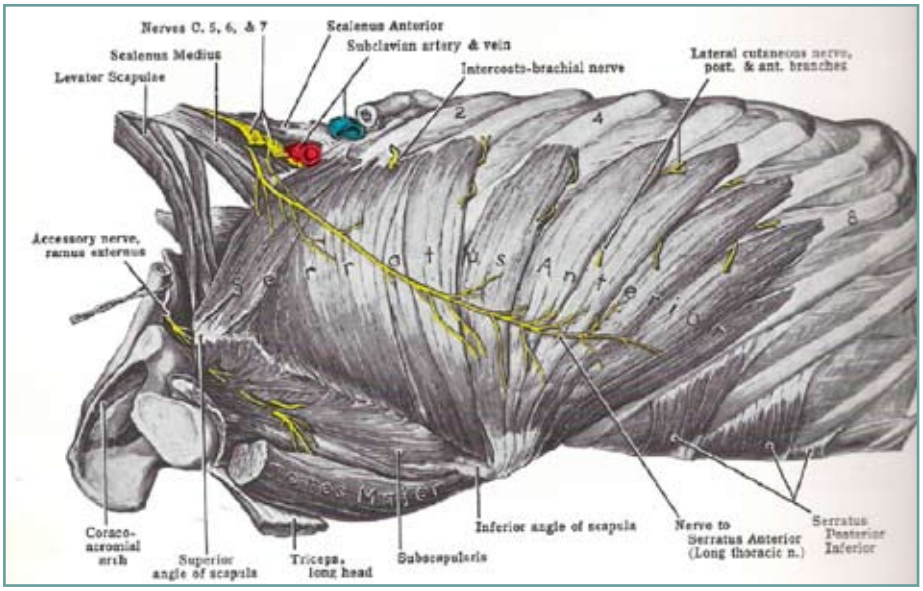
Aetiology:

The scientific researches made in order to analyze the causes of Winging Scapula shows us a very varied picture. The causes are multiple and new ones happen to appear all the time. However it is common to the described causes that an influence of n. thoracicus longus takes place. N. thoracicus longus innervates with serratus anterior. A research made by John et Kendall (1955) tells us that among 111 patients suffering from scapula alata 35 of the cases were caused by acute traumas, 16 were caused by repetitive micro traumas against n. thoracicus longus, 13 were caused by post-infectious conditions, 8 were caused by injections, 6 were caused by birth, and 7 were caused as a result of post-surgical complications. In addition to that the cause was not found in 13 cases. Furthermore Hansson (1948) ascribe 13 cases to an influence of coldness.

N. thoracicus longus:

N. thoracicus longus is a purely motor nerve. Therefore influence of stress is not registered until the secondary symptoms occur. It originates from C 5-7 whereupon it perforates m. scalenius medius. From here it runs profoundly for the clavicle straight above costa 2 and continues above m. pectoralis minor. Anterior the nerve is protected by m. pectoralis major and posterior by m. sub-

scapularis. At the same level as costa 4-5 it breaks out and runs in front of m. latissimus dorsi. In its caudal course it is only covered by skin and subcutaneous tissue which makes it very vulnerable to direct traumas. On the average n. thoracicus longus is 24 centimeters long and its length gives the nerve a certain extensibility. Also typical of n. thoracicus longus is that it only innervates with one muscle, that is m. serratus anterior. In its course it places branches to each fiber of the muscle.



N. thoracicus longus and m. serratus anterior

M. serratus anterior:
M. serratus anterior originates from costa 1-9 and fixes on Scapula's angulus superior, margo medialis and angulus inferior. The functions of the muscle are to hold scapula firmly against thorax, rotate laterally and abduct scapula. The tines of costa 1-4 are fixed on margo mediale while the remaining primarily are fixed on angulus inferior. Especially the last-mentioned is strongly conducive to the lateral rotation of scapula.

Conclusion:
During the past 170 years the condition of scapula alata has been known. The condition is characterized by the fact that scapula's margo medialis wings more or less in connection with flexion, abduction and elevation. In addition to that scapula's position of rest is changed.

The two factors – the winging of margo medialis when scapula is moved and also scapula's changed position of rest – have until now made it difficult to retrain these patients. The reason for this is an influence of n. thoracicus longus which innervates with m. serratus anterior.

Among others the purpose of m. serratus anterior is to fix margo medialis to thorax when in motion. When m. serratus anterior is brought to traction under winging of margo medialis it cannot develop any strength. After ended training scapula will therefore simply slide back into its wrong position. There will therefore be no effect of the training. From time to time a simultaneously influence of other muscles and nerves related to the shoulder takes place. This influence complicates the dyskinesis around the shoulder.

Since 1992 physiotherapists at Viborg Hospital have worked with analysis and retraining plus with the development of a »Brace«. The purpose of the brace is to fix scapula's margo medialis when in motion and at the same time re-establish the position of rest. The purpose of the retraining is to re-establish the balance of the muscles around scapula.

As a result of the public's increased awareness of the treatment the number of patients referred to us has increased vigorously. This means that we now diagnose 24 new patients each year.

On the background of our latest study (April-June 2006) it has been confirmed that our knowledge of the cause of winging scapula is far from satisfactory. Urgent questions could be:

- Why do we see a predominance of right-sided winging scapulas?
- Are the spontaneous cases / attacks arisen on the background of a neurit?
- Why are there twice as many men as women in our study?

The above make demands for a more detailed data base and also a consistent collection of data in a new prospective study / project.

Earlier publications:

Articles:
DF Kredsnyt Viborg Amt, 1998
Danske Fysioterapeuter nr. 20,4-6, November 1998
Maanedsskrift for praktisk laegegerning, August 1999; 1007-12
Ugeskrift for laeger 2003; 165: 1779-82
Dansk Sportsmedicin, November 1997

Video-presentations:
Accepted in Academy of Orthopaedic Surgery Videotape Library, 1997
American Academy of Orthopaedic Suregeons Sixty-Fifth Annual Congress, New Orleans, 19.-23. marts 1998

Lectures:
Open meeting for the Danish Society of Shoulder and Elbow Surgery, Aarhus 16.-17. april 1998
7th International Congress of Surgery of the Shoulder, Sydney, Australia, 5.-8. oktober 1998
International Symposium on Shoulder Problems in Athletes, Odense 9.-11. oktober 2000
Dansk Ortopaedkirurgisk Selskabs aarsmoede, Koebenhavn, 27.-28. oktober 2000
8th ICSS Congress, Cape Town, 23.-26. april 2001

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11 Vukov V, Ukropina D, Bumbasirevic M et al. Isolated serratus anterior paralysis: a simphsurgical procedure to reestablish scapulo-humeral dynamics. J Orthop Trauma 1996;10:341-7.
12 Rask MR. Serratus anterior muscle paralysis: »winged scapula«. J Neurol Orthp Med Surg 1992;13:125-30.
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Appendix

Red numbers = Reffered to department and diagnosed »Winging Scapula«
Green numbers = Reffered to department and after thorough examination diagnosed as »not Winging Scapula«