37 Bodybuilding

Mathias Ritsch

Bodybuilding is one of the most popular fitness sports. More than 5 million enthusiasts of all age groups practice this sport in Germany alone. About 10 % of those who do bodybuilding are achievement-oriented. This sport has found many new fans especially in Eastern European and Asian countries. It is mostly practiced in commercial fitness studios, and to a lesser extent in sports clubs. The International Federation of Bodybuilders (IFBB) is represented in 173 countries and is recognized by more than 90 national Olympic committees. In Germany, the IFBB is represented by the German Bodybuilding and Fitness Federation (DBFV e.V.). The IFBB is a member of the General Association of International Sports Federation (GAISF) and is represented at the World Games. Bodybuilding can be performed up to a high age. The positive effects of specific bodybuilding have been frequently proven, and the risk of injuries is low. In 2005, the number of members in German fitness centers was the lowest it had been for years, counting 4.19 million members, but the numbers have increased since then to 5.25 million members in 2007 (DSSV 2007).

37.1 Characteristics

Power training with the aim of forming a muscular, proportioned body, concomitantly with a low amount of body fat is the foundation of body building. Bodybuilding is a **presentation sport** classified into different weight classes. It is judged in four different categories. Line-up is followed by the compulsory poses or direct comparison in the seven compulsory poses, respectively, afterwards the freestyle posing and the finale. In the professional field, there is no weight classification. Men, women and couples are in different groups as well as bodybuilding and fitness classes, in which freestyle is evaluated higher. In addition to strength training, **nutrition** is especially decisive for success. The attempt is made to reduce the subcutaneous fatty tissue by a **special diet**, so that the muscles can be distinguished as clearly as possible. In addition to **muscle mass**, the **symmetry** and the **proportions** are especially important at the representation on stage. This can only be achieved to a certain degree, though, and the genetic preconditions play a significant role. Posing pants or a

posing bikini are worn at competitions, the body is shaved and tanning lotion and afterwards some oil is applied to the skin (> img. 37.1).

Muscle training is performed with dumbbells and barbells as well as on different training machines. Classic weight training with barbell and dumbbells is still the basis. Certain muscle groups are exercised in different exercises, which are a combination of sets with one to 15 repetitions. Depending on the frequency of training, circular training or split training are performed whereby the individual muscle groups are trained on different days. This is done as antagonist training or division into flexing and extending muscle groups.

37.2 Equipment

Special equipment, as for many other sports, is not required. Functional clothing and appropriate shoes are sensible. The training machines have reached a high standard by now and can be ideally adjusted to the individual athlete. The free weight training should be performed on special surfaces and requires the support of training partners for the maximum range. Different bandages and also the power lifting belt have proven of value for higher weights.

37.3 Most frequent injuries and strain conditions

In general, there should be no axial deformity of a higher degree, internal capacity should exist and no serious neurologic disorders such as epilepsy are found. Regarding the facts stated above, bodybuilding is possible until high age. The maximum strength training should only be carried out by persons aged 16 years and older.

Bodybuilding is one of the **sports with low injury rates**. In the statistics of sport injuries by Steinbrück (1999), bodybuilding constitutes 0.5% of all injuries. Risser (1990) states an incidence of 0.082% injuries by person and year in strength training. Injuries in bodybuilding competitions do usually not occur.

Shoulders and **elbows** are the most common injuries and damage caused by strain in bodybuilding (> img. 37.2). Two thirds of all damages appear in the region of **tendons and**

muscles, osseous injuries usually do not occur. The **injuries caused by strain** are significantly more frequent than real injuries. Based on 600 strength-sport injuries, the following aspects become obvious (Ritsch 2005): The most frequent diagnoses are tendopathies of the rotator cuffs, lateral epicondylitis and the femoropatellar pain syndrome (> tab. 37.1). The rupture of the pectoralis major and the osteolysis of the lateral clavicula are bodybuilding-specific injuries and overload damages.

Strains and muscle and tendon ruptures are the most frequent injuries in bodybuilding. Insertion tendopathies especially at the elbow, the impingement syndrome at the shoulder and the irritation of the acromioclavicular joint are the primary typical overload damages.

The **diagnosis** of the soft-tissue injuries, which represent the main part of injuries, should always include a sonographic examination, because the severity of the injury is often misunderstood clinically. Sometimes sonography can be even superior to MRI, because the real extent of a stretched injury shows up much better in the dynamic examination. Most injuries and overload damages do not cause difficulties in the orthopedic diagnosis.
The general patterns of treatment are implemented in **therapy**. Usually, no interruption of training will be necessary, because exercises can be performed around most injuries by **adjusting the training**. Insertion tendinoses react positively to changes of the joint posture and the grip span. This way, frequent relapses can also be prevented. Subacromial syndromes also require an adjustment of training. The triggering exercises such as pushing the neck behind the head or latissimus pulling behind the head should generally be carried out in front of the head. Special exercises for the training of the external rotators have proven valuable because of the increase of imbalance of the external rotators to the internal rotators at the shoulder common in strength sport. The so-called shoulder horn is accepted very well by many athletes (> img. 37.3).

The most important therapy in addition to the known therapy standards is the specified adjustment of training.

In addition to strains, the most frequent muscle injuries are **ruptures of the pectoralis major** (> img. 37.4, see color plates). Unlike described in literature (Aarimaa et al. 2004, Petilon et

al. 2005), most ruptures are not complete and affect the myotendinous junction rather than the osseous insertion (Ritsch 2004).

Generally, the early therapy will be surgical. Secondary reconstructions have clearly worse prospects. The conservative therapy, on the other hand, will always lead to unsatisfactory results.

Tendon ruptures affect the **quadriceps**, the **distal biceps tendon** and the **triceps** (Sollender 1998). The rupture of the triceps tendon is a typical injury in power sports (> img. 37.5, see color plates). In contrast to the rupture of the proximal long biceps tendon, this injury as well as the rupture of the distal biceps tendon requires surgical therapy.

Generally, an early surgical therapy is required for muscle and tendon ruptures.

The **atraumatic osteolysis of the lateral clavicula** presents an injury typical for this sport (> img. 37.6). Irritations caused by strain of the AC joint can result in an osteolysis of the lateral clavicula as a consequence (Auge and Fischer 1998). If the therapy by intraarticular cortisone infiltrations is exhausted, only the surgical resection of the lateral clavicula will achieve freedom from symptoms.

Provided exercises are done correctly and the weights are chosen correctly, injuries are very unlikely even in top athlete bodybuilding.

References

Aarimaa V, Rantanen J, Heikkila J, Helttula I, Orava S (2004). Rupture of the pectoralis major muscle. Am J Sports Med 32: 1256-1262.

Auge WK, Fischer RA (1998). Arthroscopic distal clavicle resection for isolated atraumatic osteolysis in weight lifters. Am J Sports Med 26: 189-192.

DSSV (2008). Eckdaten 2007. Fitness Management International 76: 28-30.

Petilon J, Carr DR, Sekiya JK, Unger DV (2005). Pectoralis major muscle injuries: evaluation and management. J Am Acad Orthop Surg 13: 59-68.

Risser WL (1990). Musculoskeletal injuries caused by weight training. Clin Pediatrics 29: 305-310.

Ritsch M (2004). Operative Therapie der Pectoralis-major-Ruptur. In: Schmidt-Wiethoff, Schneider, Appell (eds.). Spezialgebiete aus der Schulter- und Ellenbogenchirurgie. Steinkopff-Verlag, Darmstadt, pp 172-175.

Ritsch M (2005). Bodybuilding. In: Engelhardt M, Krüger-Franke M, Pieper HG, Siebert CH (eds.). Praxiswissen Halte- und Bewegungsorgane – Sport. Thieme-Verlag, Stuttgart.

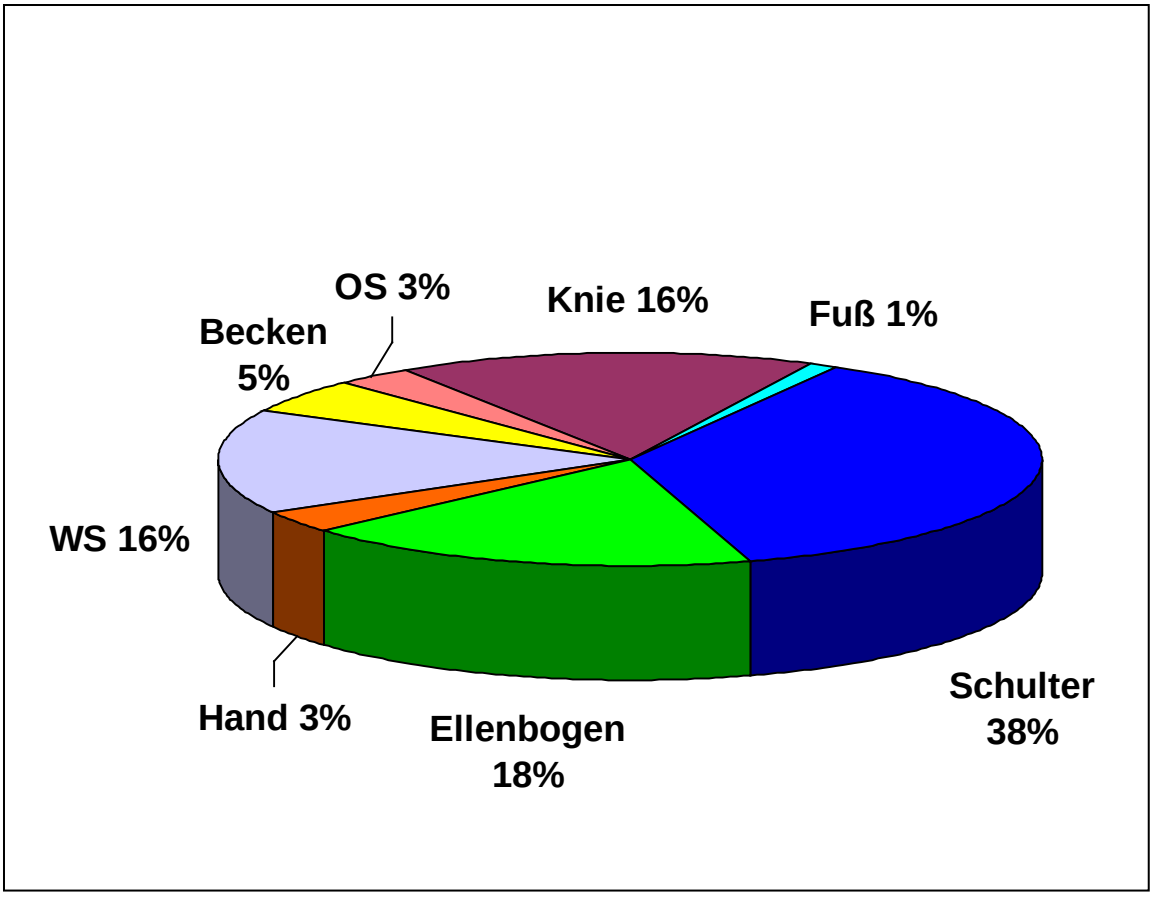
Sollender JL, Ryan GM, Barden GA (1998). Triceps tendon rupture in weight lifters. JSES 7: 151-153.

Steinbrück K (1999). Epidemiologie von Sportverletzungen – 25-Jahre-Analyse einer sportorthopädisch-traumatologischen Ambulanz. Sportverl Sportschad 13: 38-52

Tab. 37.1 Most frequent injuries in body building (Ritsch 2005).

Injury types	**n**	**Frequency**
tendopathies of the rotator cuffs	69	11.5
epicondylitis humeri radialis	42	7.0
femoropatellar pain syndrome	36	6.0
patellar apex syndrome	27	4.5
triceps tendinosis	26	4.3
AC joint irritation	24	4.0
instability impingement	23	3.8
muscular syndrome of the lumbar spine	21	3.5
pectoralis major rupture	17	2.8
quadriceps insertion tendinosis	16	2.7
distal biceps tendinosis	16	2.7
osteolysis of the lateral clavicle	15	2.5

Img. 37.1 Presentation in competition: athlete in side chest pose.



Img. 37.2 Injury profile of 600 athletic-sports injuries (Ritsch 2005).

Img. 37.3 Training of the external rotators with the shoulder horn (Hans Wagner, world champion in four-man bob, 1979).

Img. 37.4 Hematoma by rupture of the pectoralis major.

Img. 37.5 Intraoperative image of a triceps tendon rupture.

Img. 37.6 Osteolysis of the lateral clavicula (radiograph).

Published in:

Ritsch, M.: Bodybuilding;

In Sports Orthopedics – Official Manual of GOTS;

Eds: M. Engelhardt, A. Dorr, Neunplus1 2011, pp 417-420