



# Objective Measures in Sports: Hand-Wrist Injuries in Boxing



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## Introduction

The difference between subjectivity and objectivity is important when assessing and treating injuries in sports. This can make the difference between return to play via a conservative or an operative approach.

Technology has shaped the way we analyse and communicate. This is true for activities of daily living in the general population, and making its way more into sport. Diverse sports are always investigating the best outcome measures for safe return to activities post an injury. This can be observed from a recent consensus on return to play following a hamstring injury in football [1]. From this study in football, it appears that the combination of criteria from the multidisciplinary team is essential including; medical testing, conditioning testing and psychological readiness [1].

In Boxing, hand-wrist injuries account for the highest amount of days lost to training and overall duration than any other body part [2]. This is not surprising considering that forces of almost 5000N have been recorded when throwing a punch [3,4]. These forces are absorbed mainly on the knuckles and travel into the rest of the hand creating injuries at the hand-wrist region. Although the main injuries are ligamentous sprains and tears, fractures have also been observed [5]. Management of these injuries using the correct objective criteria, linked to the current available technology is therefore important [2].

## Opinion

Although hand-wrist injuries are commonly encountered in boxing, the management can be generally poor. This mainly due to lack of understanding of what objectively should be measured, other than just verbal symptoms. Three injuries commonly encountered at the hand-wrist in boxing are; the knuckles (index and/or middle finger), carpo metacarpal joints (index and/or middle finger), and metacarpal joint (thumb). Injuries are usually extensor hood (or sagittal band) tears at the knuckles, dorsal ligament tears of the carpo metacarpal joint, and ulnar collateral tears at the first metacarpal joint [6].

So how we avoid providing the usual guidance of 'rest it for a while and see how things go', which leaves the boxer frustrated when resuming activities with pain or equally not really providing

any robust comparative measurement for the practitioner? Well the basic and most significant tests encountered should involve range of motion (mobility) and strength available at these joints, together with any associated pain felt during testing. For the knuckles a device known as a finger goniometer enables the assessment of joint mobility. This should also be considered for mobility assessment after an ulnar collateral injury (or Skier's injury) of the first metacarpal joint. At the carpo metacarpal joint, mobility can be assessed using a digital inclinometer. Considering that nowadays almost everyone carries a smart phone, applications which are cheaper and more accessible than digital inclinometers can be utilised to measure wrist motions. Smartphone applications or digital inclinometers offer a better methodology than the classic goniometer for measuring mobility at the wrist.

As described by Gatt et al [2], a power grip should be tested for knuckle strength providing information on functional ability, and therefore clinically informing on injury severity. Like knuckle injuries, strength for carpo metacarpal injuries is best assessed using the hand grip dynamometer with a difference of >20% between sides (as compared to baseline) indicating a possible significant pathology. For ulnar collateral injuries, pinch grip should be tested. This is performed using devices like a pinch grip dynamometer or a handheld dynamometer (HHD). If such technology is unavailable, pinch grip is also assessed using plate weights. Plate weights measure thumb endurance, rather than strength, which is not an issue as the percentage difference between both sides and any associated symptoms should be considered more important than the recorded number. This holds truth for all other measurements discussed [7,8].

If more information is warranted, measuring mobility and strength for all the injuries mentioned at the hand-wrist in boxing can nowadays be performed with the assistance of apparatus linked directly to computer-based software. The advantage over the equipment previously discussed is that strength versus fatigue graphs can be plotted providing more detailed information. This software also enables data tracking over time. Another form of progressive technology is iso kinetic, which has been used to profile wrist and forearm strength as observed in other combat and non-combat sports [1,9]. Iso kinetic provides specific information

linked to the different muscle strength components at the wrist (i.e. Flexors versus Extensors, Concentric versus Eccentric, Different Speeds). Iso kinetic should also be considered for proprioceptive type assessment, which forms an essential component of wrist injury [3,4].

With these objective measures in mind, it is recommended that medical-rehabilitative practitioners encountering boxing injuries at the hand-wrist should become more familiar with these technologies and associated methodologies. This will improve the initial diagnosis, which together with a radiographic scan (if felt required), can improve the prognosis of an injury. Progression of an injury would also be more objectively assessed, together with enhanced return to play criterion. Similar to the consensus study described earlier for hamstring injuries in football, conditioning tests and psychological readiness need to be considered before return to boxing activities. Further, the initial response to boxing activities should also guide compliance with timescales for full return to training and competition.

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