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Biomechanical Characteristics of Basketball Shooting Techniques and Impact of Rotator Cuff Injuries on Shooting Skills

Dimo Zhu

College of Chemical Engineering and Materials, Tianjin University of Science and Technology, Tianjin, China
zhudimo0313@outlook.com

Abstract. In basketball, the shooting method is a crucial skill that has a direct bearing on a player's capacity to score and their overall game. Meanwhile, injuries to the rotator cuff can have a serious impact on these shooting abilities, comprehending the biomechanical traits of basketball shooting methods and how rotator cuff injuries influence them holds important practical value. This paper centered on probing into the biomechanical traits of basketball shooting methods and looking into how rotator cuff injuries specifically influenced shooting abilities by dissecting the biomechanical transfer mechanisms and principles during crucial shooting stages and combining them with the pathological processes and kinematic characteristics of rotator cuff injuries, the research disclosed that these injuries significantly impacted shooting steadiness, power output, movement patterns and effectiveness as they made shooting less accurate, decreased the amount of force generated, changed the shooting mechanics and led to a drop in overall shooting performance. Moreover, the paper put forward specific rehabilitation and training approaches with the aim of reducing the negative impacts that rotator cuff injuries have on shooting abilities, the study laid a theoretical groundwork for improving basketball players' shooting methods, averting injuries and promoting scientific rehabilitation, thus making contributions to boosting players' performance and extending their careers in the sport.

Keywords: Shooting technique, rotator cuff muscle injury, biomechanics, rehabilitation strategies, training methods.

1. Introduction

In the ever - changing and highly competitive world of basketball, shooting is a basic yet extremely important ability which directly determines the result of games and significantly affects how efficiently one can score due to its accuracy and constancy; as it is a high - precision motion, shooting demands the coordinated production of strength among numerous joints in strict accordance with the principles of human biomechanics and the shoulder joint, being a key part of this complex movement sequence, has a vital function in transmitting power and conducting force in the sagittal plane during the shooting process; among the muscles that keep this joint stable, the

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rotator cuff muscle group holds an utmost position as it ensures the stability of the shoulder and enables the smooth execution of movements [1,2].

Most of the research regarding basketball shooting techniques has centered on improving shooting form, boosting shooting precision, and probing into the biomechanical fundamentals of shooting movements; nevertheless, the influence of injuries, especially those that impair the rotator cuff muscle group, on shooting performance has been comparatively less emphasized even though such injuries are quite common among basketball players and when there were studies, they usually focused on the general impacts of shoulder injuries on upper-limb functions rather than looking into the particular biomechanical changes brought about by rotator cuff injuries during shooting; by contrast, domestic research has begun to see the importance of this matter and an increasing number of works are examining the connection between rotator cuff injuries and shooting mechanics, but a thorough analysis from a biomechanical standpoint is still missing.

Considering how crucial shooting is in basketball and the possibly harmful impacts that rotator cuff injuries can have on shooting performance, this paper was driven by the necessity to fill in the existing research gap, so taking a biomechanical perspective, this study intended to methodically examine how injuries to the rotator cuff muscle group affected shooting movements by concentrating on changes in mechanical transfer routes, shooting steadiness, power generation, and movement patterns, and moreover, the paper aimed to suggest scientific rehabilitation and training means specifically designed to lessen these negative effects, which would improve players' shooting ability and cut down the chance of more severe injuries, and the framework of this paper included a thorough biomechanical study of shooting skills, a deep - seated exploration of the mechanisms behind rotator cuff injuries and their kinematic characteristics, and the creation and verification of targeted rehabilitation and training plans, and through this all-encompassing method, the writer hoped to make contributions to the enhancement of basketball shooting skills, injury avoidance, and scientific rehabilitation procedures.

2. Biomechanical characteristics of basketball shooting techniques

2.1. Mechanical transmission mechanisms of shooting actions

2.1.1. Lower limb force generation and Ground Reaction Force (GRF)

Shooting motions can be mainly divided into four crucial stages, each having biomechanical traits that directly impact the stability and accuracy of the ultimate release and the generation of force from the lower limbs serves as the chief source of power for the whole shooting motion (mainly accomplished through the extension of the hips, knees, and ankles, which are together called triple extension), when the lower limbs generate force, muscles experience eccentric stretching (hip flexion, knee flexion, plantarflexion) to store elastic energy and then rapidly contract concentrically to produce a thrust against the ground [3,4].

According to Newton's third law, the ground produces a reaction force that propels the body upward or forward, providing initial kinetic energy to the upper body and trunk. The Ground Reaction Force (GRF) is conveyed along the body's force pathways from the lower limbs to other regions, involves the transfer of energy from the foot - ground contact area to the lower limb bones and muscles, and subsequently moves upwards to the trunk and upper limbs via knee extension, hip extension, and plantar flexion. Kinesiological research showed that the speed of knee and hip extension as well as the strength of ankle plantarflexion when in contact with the ground had a direct impact on the vertical height of the shooting trajectory and the power output during shooting.

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2.1.2. Trunk stability and force transmission

Trunk stability is of crucial significance throughout the whole shooting procedure as a firm and steady core trunk could cut down on the energy loss which occurs when biological energy gets converted into heat or other forms during the transfer of power and once the core muscle groups in the trunk (such as rectus abdominis, multifidus) receive kinetic energy from the lower limbs they offer powerful support and maintain stability to guarantee effective energy conveyance to the upper limbs mainly depending on trunk rotation, the generation of core strength, and core control and coordination.

During shooting, there is obvious trunk rotation and core force production as well as coordinated shoulder and pelvic rotation which boosts force generation effectiveness and guarantees efficient energy transfer, at the same time, trunk stiffness stops energy from being lost during movement, and core management and coordination are accomplished by powerful core muscle groups (such as rectus abdominis, transverse abdominis, erector spinae, and multifidus) which stabilize the lumbar spine and pelvis to cut down on energy loss and make upper limb movements better while keeping stable force lines [5].

2.1.3. Upper limb coordinated force generation

When the energy produced by the lower limbs gets transmitted via the trunk to the upper limbs, the shoulder and elbow joints had to generate precise coordinated force to guarantee a stable release of the ball and for basketball players' kinetic chains to set up proper ball release speed, angle, and height, they required good function of their shoulder and elbow joints. Even the slightest alterations in the joint angular velocity when shooting have a substantial impact on the ball's ultimate release and flight path; in the early stage of the upper limb generating coordinated force, the shoulder joint's rotation and abduction imparted speed for the ball's release and the elbow joint's rotation and extension augmented the ball's backspin effect; in the release stage, the forearm demonstrated a multi - joint chain - like movement resembling a "whip" and the wrist and fingers carried out the last motion and completed the power transfer.

2.1.4. Precise control of fingers and wrist

The last shooting move was carried out by the wrist and fingers which needed an exceptionally high level of control to guarantee a steady release of the ball and the rotation degree, direction, and release strength of the ball were controlled by the fingers and wrists as well and from a biomechanical point of view, the speed and extent of wrist adduction and flexion directly decided the release speed and rotation angle of the basketball.

When you flex your wrist quickly and powerfully, more impetus gets transferred to the basketball, causing it to travel further, and fingers have a more delicate function during shooting as they mainly direct the basketball and give it the initial spin for backspin, so when the ball is released, fingers, especially the index and middle ones, do a flicking motion on the ball, which makes the basketball follow the desired flight path and provides enough backspin to create the "Magnus effect", allowing the ball to generate a vertical downward force near the end of its flight, thus making it "fall" into the basket and enhancing shooting accuracy.

2.2. Biomechanical optimization of shooting actions

Shooting motions are intricate and highly synchronized chain - like movements and biomechanical dissection centers on the force transfer procedure from the lower extremities to the upper extremities so biomechanical enhancement of shooting could be attained via technical approaches and a motion capture setup was able to precisely register an athlete's three - dimensional motion path and joint angle data while shooting by utilizing high - speed cameras and markers (or marker - less tracking systems) [1,6].

For instance, when looking into the leaping moves of 200 basketball players, motion capture devices and force platforms were employed, and the force platforms measured the Ground Reaction Force (GRF) between the athletes and the ground while they were shooting, which offered important details regarding force production and transfer, moreover, electromyography (EMG) could register the electrical activities of muscles, showing the timing and strength of muscle activation, helping in evaluating the contributions of various muscles during shooting actions, for example, the Electromyography - Force Processing (EFP) model was created to estimate the forces of knee muscles during walking and evaluate the force output of the muscle - tendon unit (MTU) in gait - related EMG activity [5].

By means of biomechanical examination, individualized training approaches could be offered to athletes with diverse skill levels to enhance the performance of kinetic - chain transmission; for instance, through the reconstruction of three - dimensional models and the collection of data, postural malalignment, muscular and joint disorders might be detected and in light of biomechanical responses, an athlete's shooting stance, force dispersion, and force application timing could be precisely regulated, for example, modifying the timing of jumping and releasing was able to boost force - transmission efficiency and the trajectory of shooting, thus affording personalized training to athletes.

2.3. Neuromuscular control and coordination in shooting actions

Shooting actions entail the synchronized movement of numerous large muscle groups such as the hip extensor groups, trunk core muscle groups (rectus abdominis, obliques, erector spinae) and upper limb muscle groups [7]. Neuromuscular control and coordination were of great significance for technical actions like shooting which demanded coordination among multi - muscle groups and multi - joints and neuromuscular control training allowed athletes to have more precise control over the sequences of muscle force generation during shooting actions thus preventing decreased force output resulting from antagonist muscle activation or wrong force sequences and avoiding the "hand fast, feet slow" phenomena [5,7].

2.4. Biomechanical parameters of shooting

Parameters in biomechanics which measure how effectively neuromuscular control works and how efficiently force gets transmitted consist of Ground Reaction Force (GRF), the kinetic chain, and joint angles, GRF serves as the starting point of shooting mechanics and its peak quantity and direction determine the overall strength of the kinetic chain, the shooting movement depends on the sequential transfer of energy from the bottom up and any loss of energy would decrease efficiency and new research shows that involving all - body muscles in generating force together was needed for achieving higher jump shot release speeds, alterations in the angles and the sizes of the arcs of

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the hip, knee, and elbow joints are directly associated with the trajectory and force of the ball's release [6,7].

3. Biomechanical characteristics and pathological mechanisms of rotator cuff injuries

3.1. Anatomical structure of the rotator cuff muscle group

The rotator cuff muscle group includes the infraspinatus (ISP), supraspinatus (SSP), teres minor (TM), and subscapularis (SSC), mainly working to keep the dynamic stability of the glenohumeral joint and scapula, as could be seen from Figure 1 and Figure 2, the infraspinatus was in the infraspinous fossa of the scapula, next to the teres minor, the supraspinatus was in the supraspinous fossa, and the subscapularis was in the subscapular fossa on the front side of the scapula and it was the biggest muscle in this group [8,9].

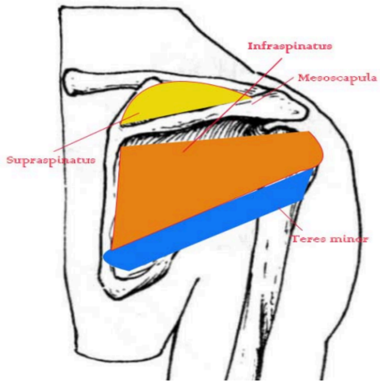

Figure 1. Anatomical structure of the rotator cuff muscle group on the posterior scapula [9]

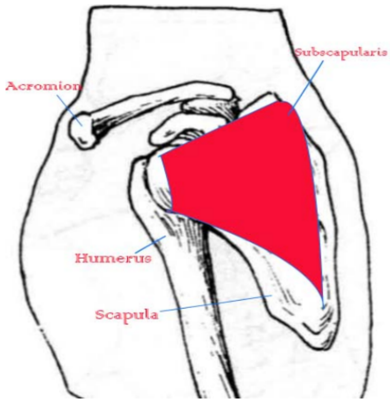

Figure 2. Anatomical structure of the rotator cuff muscle group on the anterior scapula [9]

3.2. Biomechanical functions of the rotator cuff muscle group

The rotator cuff muscles collaborate to offer stability to the glenohumeral joint and are of great significance in diverse shoulder joint motions like lifting the arm away from the body (abduction), moving it back towards the body (adduction), bending forward (flexion), extending backward (extension), rotating inward (internal rotation), and turning outward (external rotation) and they keep the humeral head stable within the glenoid fossa of the scapula via coordinated contraction, averting dislocation of the humeral head.

The supraspinatus (SSP) situated above the deltoid and beneath the humeral head chiefly serves to abduct the shoulder joint (raise the arm far from the body) and holds a crucial part in the initial 15° of shoulder abduction, the infraspinatus (ISP) placed in the infraspinous fossa is mainly in charge of shoulder joint external rotation, collaborating with the teres minor (TM) to externally rotate the humeral head, meanwhile the teres minor which stems from the lateral edge of the scapula mostly works to externally rotate and adduct the arm and the subscapularis mainly functions to internally rotate the arm [8].

3.3. Biomechanical causes and specific manifestations of rotator cuff injuries

Rotator cuff injuries mainly stem from functional impairment caused by harm to the rotator cuff muscle group, showing up as a weakening or total absence of the shoulder joint's ability to abduct, adduct, extend, flex and internally and externally rotate the humeral head, and in line with pathological features and clinical practice, they could be divided into three levels - Level 1 injuries were slight, marked by tendon swelling and congestion, which brought about shoulder ache and a 5-10% reduction in throwing strength, Level 2 injuries were moderate, entailed partial muscle ruptures, led to deformation of the throwing motion and a 15 - 20% decline in throwing precision, and Level 3 injuries were serious, involved complete muscle rupture, made the athlete unable to finish throwing actions and resulted in the complete loss of active shoulder joint movement.

The biomechanical origins of rotator cuff injuries could be divided into a number of kinds, mainly because of too much strain on the rotator cuff tendons when the shoulder joint was active and excessive movement of the shoulder joint making the pressure at the tendon - bone interface go beyond what was tolerable, resulting in ruptures, also long - term repeated throwing actions might also lead to stress - related harm to the rotator cuff muscle group, causing tendon degeneration and fibrosis and slowly turning into chronic tendinitis or ruptures over time.

4. Impact of rotator cuff injuries on shooting actions

4.1. Impact on shooting stability

Rotator cuff injuries result in diminished shoulder joint stability and when playing basketball and shooting, athletes have to lift their arms over their heads which demands shoulder joint movement within the sagittal and frontal planes to generate initial velocity and set up a proper release angle for the basketball and the instability of the shoulder joint brought about by rotator cuff injuries limits the shoulder joint's abduction and flexion during shooting and the shoulder muscles and tendons that are damaged can't offer enough muscle power to steadily raise the upper arm and meanwhile the range of motion of the shoulder joint also lessens which greatly reduces shooting stability and moreover since the rotator cuff muscles are a crucial source of shoulder joint force output, injuries to them lead to a substantial drop in the strength and muscular endurance of these muscles which makes shooting stability and accuracy decline at different fatigue levels among athletes [10].

4.2. Impact on shooting movement patterns and kinetic chain transmission

Injuries to the rotator cuff muscle group lessen the force output of the shoulder joint which results in inadequate transmission within the kinetic chain when shooting and a reduction in the efficiency of force transmission so that the force generated by the lower limbs can't be effectively transferred to the arms making the shooting motion deformed or losing its fluency. Following an injury, the humeral head's capacity to keep its position inside the glenoid fossa was reduced, which frequently resulted in shoulder joint subluxation or irregular sliding when shooting, for example, at the instant of releasing the shot, the rotator cuff couldn't efficiently prevent the humeral head from rising, setting off a "Pain Reflex Arc" and making the athlete lower the release height or change the release angle [11].

Furthermore, injuries to the rotator cuff muscle group and the resulting loss of function lead to compensatory force production in other muscles, making the latissimus dorsi and teres major overly active as they try to keep stability by pulling down the scapula, but this compensation upsets the shooter's "elevation - rotation" mechanism, causing the release path to veer off and possibly setting off muscle or joint strain in other parts, raising the likelihood of secondary injuries and creating an "injury chain", while at the same time, abnormal movement patterns disrupt muscle memory, forcing athletes to re - adapt to force generation sequences [11].

4.3. Impact on shooting efficiency

Alterations in movement patterns resulting from rotator cuff injuries made it necessary for athletes to either adjust release angles and heights or boost lower - limb extension and knee-flexion angles so as to keep up the original force output, and the appearance of this compensatory mechanism messed up the athletes' inborn muscle memory, compelling them to get accustomed to new force - generating sequences and muscle - control proprioception, which led to a reduction in shooting accuracy.

Field Goal Percentage (FG%), which is a crucial measure for assessing an athlete's shooting effectiveness, directly shows alterations in shooting capability and Kobe experienced a substantial drop in his FG% following a rotator cuff tear as could be seen in Figure 3 and Figure 4, which demonstrated how such injuries affected an athlete's shooting sense of body position and led to a reduction in shooting precision; moreover, this injury made it difficult for Kobe to keep his shooting techniques steady during a highly intense game and the increased fluctuations in his FG% post - injury indicated the influence of the rotator cuff tear on him [2].

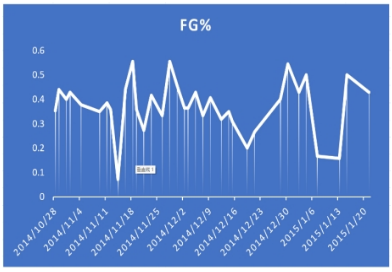

Figure 3. 2014-2015 season FG%

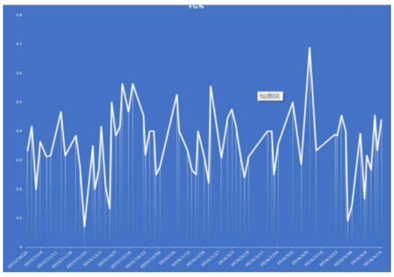

Figure 4. 2015-2016 season FG%

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4.4. Psychological impact on athletes

Rotator cuff injuries exert a substantial psychological influence on basketball players, mainly showing up as anxious and depressive feelings, a dread of movement and evasive actions, self - mistrust, and reduced self - assurance and the rehabilitation process for such injuries is lengthy with pain and limitations on activities lasting for several months or even more so athletes might endure severe anxiety because of their incapacity to train and compete, fretting over a possible disruption in their careers, a loss of their competitive edge or missing out on crucial occasions [12,13].

For instance, in 2015, Kobe was diagnosed with a torn right shoulder rotator cuff yet he carried on playing but had a downcast look and a rather resigned "OK" reply which showed his powerlessness and the mental stress he was under concerning the injury and some athletes, after suffering from rotator cuff injuries, altered their shooting stances out of fear of getting re - injured as a result their shooting precision went down and they bore even more psychological load.

5. Rehabilitation strategies for rotator cuff injuries and optimization of shooting techniques

5.1. Rehabilitation strategies across different phases

Over 72% of NBA players who had shoulder injuries reported having continuous problems all the way till their retirement and 24% among them thought that they had never entirely recovered to their pre - injury performance levels, so choosing proper rehabilitation methods was extremely important; the rehabilitation period following a rotator cuff injury could be roughly divided into three stages, namely the acute inflammatory stage, the fibroblast repair stage and the maturation - remodeling stage [2].

5.1.1. Acute inflammatory phase (0-2 weeks)

In the acute inflammatory period, the main aim was to cut down on inflammation, ease pain, and stop secondary injuries, so rest, immobilization or brace utilization could lessen shoulder movement to prevent more damage, and within 48 hours after getting hurt, applying cold compresses promoted vasoconstriction, decreased swelling and lessened pain, also non-steroidal anti-inflammatory medicines (NSAIDs) like celecoxib and meloxicam might have been prescribed and local corticosteroid injections were also used to hold back inflammation and make the pain go away [14,15].

5.1.2. Fibroblast repair phase (2-6 weeks)

In the fibroblast repair stage, the primary aims were to reinstate the joint's range of motion, cut down on muscle adhesions, enliven muscles, stop muscle atrophy and keep up the overall physical functionality; passive range - of - motion exercises aided by a therapist could involve straightforward shoulder external rotation, forward flexion or abduction while making sure that the movements stayed within a pain - free range and isometric contractions in which the rotator cuff muscles contracted without altering joint angles might activate muscles without heightening tendon stress.

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5.1.3. Maturation-remodeling phase (6 weeks to several months)

In the maturation - remodeling period, the main aim was to fortify the rotator cuff muscles, reestablish and enhance their functionality, and make it possible for one to safely go back to sports or day - to - day activities, so athletes were supposed to take part in step - by - step exercises which put controlled strain on the injured areas, slowly raising the load over time to straighten out the collagen fibers and promote muscle growth, and as physical capabilities got better, rehabilitation should have centered on sport - related movements, including particular joint positions, muscle strengthening, activating muscles at specific speeds, doing closed - chain exercises, and training for neuromuscular control to mimic the requirements of games [16].

5.2. Optimization strategies for shooting techniques

After sustaining a rotator cuff injury, optimizing shooting techniques entails both technical modifications and augmentations in physical conditioning; technical alterations such as decreasing the shooting trajectory and the height at which the shot is released can be achieved by lessening the angles of shoulder abduction and forward flexion, which serves to alleviate stress on the rotator cuff and diminish the likelihood of secondary injuries while ensuring sufficient force output and the speed at which the ball is launched, and strengthening the lower extremities and core to make up for decreased shoulder participation like boosting the flexion angles of the knees and hips during jumps to create more force from the lower limbs and employing rapid wrist movements to produce a "whiplash" - like effect that enhances the efficiency of kinetic chain transmission were also part of it; physical conditioning enhancements encompassed enhancing the stability and strength of the rotator cuff through isometric and eccentric training and improving neuromuscular control via Proprioceptive Neuromuscular Facilitation exercises which fortified neural control and coordination, curbed excessive activation of antagonist muscles during shooting, and boosted force transmission efficiency; integrating these approaches enabled basketball players to recuperate more efficaciously from rotator cuff injuries, cut down on the risk of re - injury, and retrieve their optimal shooting performance [1,5,7].

6. Conclusion

This study explored the biomechanical traits of basketball shooting methods and the substantial influence of rotator cuff injuries on shooting abilities; by conducting a thorough biomechanical examination, it was found that rotator cuff injuries considerably weakened shooting steadiness, power production, movement forms, and general effectiveness, specifically resulting in lower shooting precision, lessened force creation, and modified shooting mechanisms; moreover, the study showed that these injuries triggered compensatory movements in other muscle areas, disturbing the normal kinetic chain transfer and leading to additional injuries; also, the mental strain on athletes, like anxiety and reduced self - confidence, worsened the drop in shooting performance; the importance of this research was that it might be helpful in forming specific rehabilitation and training approaches designed to lessen the harmful consequences of rotator cuff injuries and could offer detailed anatomical basics regarding rotator cuff injuries for individuals seeking to do in - depth research on improving shooting techniques. However, the study was restricted due to its dependence on biomechanical data and there was a necessity for more longitudinal studies to evaluate long - term rehabilitation results, so future research ought to look into advanced imaging methods to gain a better understanding of the pathological processes of rotator cuff injuries and

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create more individualized rehabilitation plans, and moreover, examining the psychological elements of injury recovery might offer a more comprehensive way to boost athletes' performance and well-being.

References

[1] Cabarkapa, D., Cabarkapa, D. V., Miller, J. D., Templin, T. T., Frazer, L. L., Nicolella, D. P., & Fry, A. C. (2023). Biomechanical characteristics of proficient free-throw shooters-markerless motion capture analysis. Frontiers in sports and active living, 5, 1208915. https: //doi.org/10.3389/fspor.2023.1208915
[2] Morikawa, L. H., Tummala, S. V., Brinkman, J. C., Crijns, T. J., Lai, C. H., & Chhabra, A. (2023). Shoulder and Elbow Injuries in National Basketball Association Athletes and Their Effects on Player Performance. Orthopaedic Journal of Sports Medicine, 11(10). doi: 10.1177/23259671231202973
[3] Sifuentes-Cervantes, J. S., Bravo-Liranza, V. M., Pérez-Nuñez, L. I., Martinez-Rovira, A., Castro-Núñez, J., & Guerrero, L. M. (2023). Facial Injuries in the National Basketball Association. Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons, 81(12), 1517–1525. https: //doi.org/10.1016/j.joms.2023.09.009
[4] Chiang, C. Y., Chiang, Y. C., Lin, H. Y., Tseng, H. C., Chu, M. Y., & Chang, J. S. (2025). Lower Extremity Stretch-Shortening Cycle Performance in the Vertical and Horizontal Direction as Key Determinants of Success in Collegiate Male Taekwondo. Journal of functional morphology and kinesiology, 10(1), 15. https: //doi.org/10.3390/jfmk10010015
[5] Zhou, Q., Wu, S., Zhang, J., Pan, Z., Kang, Z., & Ma, Y. (2025). Research on the Impact of Shot Selection on Neuromuscular Control Strategies During Basketball Shooting. Sensors (Basel, Switzerland), 25(13), 4104. https: //doi.org/10.3390/s25134104
[6] Ammar, A., Chtourou, H., Abdelkarim, O., Parish, A., & Hoekelmann, A. (2016). Free throw shot in basketball: kinematic analysis of scored and missed shots during the learning process. Sport Sciences for Health, 12(1), 27-33.
[7] Fan, P., Yang, Z., Wang, T., Li, J., Kim, Y., & Kim, S. (2024). Neuromuscular Control Strategies in Basketball Shooting: Distance-Dependent Analysis of Muscle Synergies. Journal of sports science & medicine, 23(1), 571–580. https: //doi.org/10.52082/jssm.2024.571
[8] Roberts, C. C., & Escobar , E. (2025). Shoulder Arthrogram. In StatPearls. StatPearls Publishing.
[9] Gu, D. M., Miao, J. C., & Ding, Y. S. (2013). Atlas of sports anatomy (3rd ed.). People's Sports Publishing House.
[10] May, T., & Garmel, G. M. (2023). Rotator Cuff Injury. In StatPearls. StatPearls Publishing.
[11] Sripathi, P., & K. Agrawal, D. (2024). Rotator Cuff Injury: Pathogenesis, Biomechanics, and Repair. Journal of Orthopaedics and Sports Medicine, 6(4). https: //doi.org/10.26502/josm.511500167
[12] Rogers, D. L., Tanaka, M. J., Cosgarea, A. J., Ginsburg, R. D., & Dreher, G. M. (2024). How Mental Health Affects Injury Risk and Outcomes in Athletes. Sports health, 16(2), 222–229. https: //doi.org/10.1177/19417381231179678
[13] Feltri, P., Monteleone, A. S., Audigé, L., Marbach, F., Filardo, G., & Candrian, C. (2024). Patients with rotator cuff tears present a psychological impairment, not only a functional deficit: a systematic review. International orthopaedics, 48(1), 169–181. https: //doi.org/10.1007/s00264-023-05952-1
[14] Herman, Z. J., Reddy, R. P., Fails, A., Lin, A., & Popchak, A. (2024). Rehabilitation and Return to Sport following Operative and Nonoperative Treatment of Anterior Shoulder Instability. Clinics in sports medicine, 43(4), 705–722. https: //doi.org/10.1016/j.csm.2024.03.025
[15] Hammond, K. E., Kneer, L., & Cicinelli, P. (2021). Rehabilitation of Soft Tissue Injuries of the Hip and Pelvis. Clinics in sports medicine, 40(2), 409–428. https: //doi.org/10.1016/j.csm.2021.01.002
[16] Grooms, D. R., Chaput, M., Simon, J. E., Criss, C. R., Myer, G. D., & Diekfuss, J. A. (2023). Combining Neurocognitive and Functional Tests to Improve Return-to-Sport Decisions Following ACL Reconstruction. The Journal of orthopaedic and sports physical therapy, 53(8), 415–419. https: //doi.org/10.2519/jospt.2023.11489