Right Knee ACL, PCL, and MCL Reconstruction *with Sports-Related Anxiety*

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Abstract

Introduction

JM, a 20-year-old male professional ice hockey player, presented with a 2-week history of lack of range of motion, weakness, and pain in his right knee, after a 2-year post-medial collateral ligament repair of the right knee and 3 year-post anterior cruciate ligament, posterior cruciate ligament, and medial collateral ligament reconstruction of the right knee.

Case Description

In the course of history taking, it was revealed that 5 months prior to admission the patient had been informed by a psychiatrist that he had sport-related anxiety. With an unremarkable psychiatric history prior to age 18, the competitive nature of his sports career in addition to financial pressures may have contributed to his sports-related anxiety. His examination findings were consistent with a diagnosis of complete tears of the right anterior cruciate ligament and posterior cruciate ligament along with a grade III medial collateral ligament injury.

Discussion

The biopsychosocial model was used to explicate JM's case. JM's current injuries prompted reconstruction of the anterior cruciate, posterior cruciate, and medical collateral ligaments. Psychologically, JM's sports-related anxiety is not a rare phenomenon as recent studies have discovered an increased risk of sports-related anxiety amongst young professional athletes. Sports-related anxiety, along with competitive trait anxiety, may be factors that contribute to sports injury occurrence. Other psychosocial stressors can add to sports-related or competitive trait anxiety, further increasing the risk of sports injury reoccurrence.

Summary

JM was admitted for a right knee open medial collateral ligament repair with internal bracing, anterior cruciate ligament reconstruction, posterior cruciate ligament reconstruction, and platelet rich plasma injection. As part of a holistic patient-centered treatment plan, a referral to psychiatry was made to address JM's sports-related anxiety with the goal of decreasing future risk of sports injury.

Patient's Consent Obtained

Yes.

Introduction

Patient Details

Name: JM
Dates Seen: October 28-November 1, 2019
Location: USA

Glossary of Abbreviations

ACL: anterior cruciate ligament
ARecon: arthroscopic reconstruction
ARep: arthroscopic repair
AVPU: alert, verbal, pain, unresponsive
BMI: body mass index
CBT: cognitive behavioral therapy
CTA: competitive trait anxiety
CVS: cardiovascular
GI: gastrointestinal
Hx: history
ICE: ideas, concerns, expectations
LCL: lateral collateral ligament
MCL: medial collateral ligament
MLIs: multiple ligament injuries
MRI: magnetic resonance imaging
MSK: musculoskeletal
Neuro: neurological
NKDA: no known drug allergies
P/C: presenting complaint
PCL: posterior cruciate ligament
PRP: platelet rich plasma
PSSI: perceived susceptibility to sport injury
RCT: random controlled trial
Resp: respiratory
ROM: range of motion
ROS: review of systems
SI: sports injury
SIO: sports injury occurrence
SRA: sports-related anxiety

Case Description

Case History

JM is a 20-year-old male professional ice hockey player who presented with a 2-week history of lack of ROM, weakness, and pain in his right knee after a two-year post-MCL repair of the right knee and three-year post ACL, PCL, and MCL reconstruction of the right knee. JM re-injured his knee during a hockey game; JM was tackled and fell onto the ice with his right knee extended and laterally rotated. JM was conscious after the fall and remembers sharp pain in his right knee. The pain was localized to right medial and anterior knee and was rated as 6/10 after the initial fall. On exam, lack of range of motion was observed with flexion, extension, and rotation of the knee. He demonstrated an antalgic gait without use of crutches along with positive right knee anterior drawer, Lachman, posterior drawer, and valgus stress tests.
In the past, JM underwent ARecon of right ACL, PCL, and MCL (April 2016) and ARep of right MCL (July 2017). With an unremarkable medical and family history, JM began sessions with a psychiatrist in May 2019 due to nervous thoughts, excessive diaphoresis, and nausea before scrimmages. Although there was no DSM diagnosis, he was told he has SRA with ice hockey and was referred to Ph.D. psychologist for CBT. In familial context, JM gained control of his family's finances two years prior. JM had never been given endorsements, yet he helped pay his parents' mortgage. During JM's childhood, his family spent funds on his ice hockey career. JM has since felt financially responsible for his family. JM has never drunk nor smoked and describes himself as well-liked, liberal-minded, adaptable, athletic, and easy-going. He hopes to feel "ready to play" as soon as possible and acknowledged that health and recovery time were important for long-term results. His main concern involved his time of return to play and its impact on his family's finances.

Diagnosis & Treatment Plan

MRI results included a non-visualization of ACL and PCL fibers indicative of complete full thickness tears as well as a grade III MCL injury. A surgical plan involving right knee open MCL repair with internal bracing, ACL reconstruction, PCL reconstruction, and PRP injection was planned.

Discussion

To explicate this case, the biopsychosocial model will be used. Developed by George Engel, this model is an application of general systems theory to humanity [1]. Although studies acknowledge the difficulty of implementing this model across all cases, each patient's biopsychosocial circumstance should be considered in a multidisciplinary, patient-centered approach [1,2]. The medical team responsible for patient care should therefore address the biological disease, social context of the patient's life, and the patient's psychological position to create a holistic, patient-centered treatment plan.

Biological Factors

In professional sports, MLIs can involve at least 2 of 4 ligaments – the ACL, PCL, MCL, or LCL. Although individual ligament injuries prompt standardized treatments, less consensus regarding treatment of MLIs exists; therefore, research assessing treatments and success rates of MLIs has been conducted recently. In fact, early operative intervention of MLIs, compared to rehabilitation and time, is associated with increased functional and clinical outcomes [3]. Now, researchers have proposed a "standard" treat-

ment for MLIs. A thorough physical exam should include Lachman's test, Posterior Drawer test, valgus stress at 0 and 30 degrees of flexion, varus stress at 30 degrees flexion, Slocum test, and External Rotation Dial test [3]. A stress radiography to visualize functional laxities can also supplement the MRI.

Once in the operating room, the medical team should prepare reconstructive grafts. A patellar tendon is the PCL graft choice, ipsilateral hamstring (gracilis or semitendinosus) is for the ACL, and semitendinosus allografts are used for the MCL and LCL [3,4]. Due to JM's athleticism, his first ACL reconstruction was a patellar tendon, and this second reconstruction called for a hamstring graft. Although autografts may result in speedier recovery times in athletes, RCTs have discovered no significant differences result in speedier recovery times in athletes, RCTs have discovered no significant differences

Psychological Factors

In April 2019, JM experienced anxious thoughts, excessive diaphoresis, and nausea the morning of a practice game. He had experienced nervousness and nausea before games, but the accompanied diaphoresis and focus on intrusive thoughts began in January 2019. He therefore visited a psychiatrist, who disclosed JM's SRA.

Although not a DSM diagnosis, SRA is broadly defined as a trait and/or state-like response to a stressful sports circumstance, in which the patient experiences cognitive appraisals, physiological arousal, and/or behavioral reactions [5]. A patient's poor response to a stressful sports-related circumstance is associated with an increased risk of SI [6,7]. In addition to impacting SI onset, anxiety and poor coping mechanisms can affect physical and psychosocial rehabilitation results [6,7].

For JM, his age correlates with that of a meta-analysis finding – competitive elite competition directly overlaps with peak ages of mental disorder onset. 75% of mental disorders typically occur before age 25, with elite athletes feeling discouraged from disclosing their anxiety due to stigma and fear of not making team selection.[6,7] JM's role as an alternate also demonstrates that elite athletes at higher competitive levels report fewer levels of anxiety, compared to their second-string counterparts [7].

In January 2019, JM graduated from benched player to alternate, one rung below first-string. The possibility of replacing an injured first-string player may have triggered his SRA, even during practice games. Although the mechanism of anxiety leading to injury is unclear, this SRA may have been a factor in JM's reinjury of his right ACL, PCL, and MCL. To combat re-injury and further anxiety, JM was referred to a sports-specialized psychiatrist after his surgery and a sports-specific rehabilitation center.

Social Factors

Although JM's anxiety appears to originate from sports, his financial stress may have contributed to his current state. During the economic recession, his parents lost more than half of their savings. They then relied on food stamps and moved to affordable housing, an hour and a half away from the closest ice rink. What was left of their finances was sent to JM for his hopeful ice hockey career.

Now, JM feels responsible for his family's finances. Financial strain at a young age is correlated with physical health problems during adulthood [8]. On the other hand, acute periods of strain are more likely linked with mental health changes, compared to physical ones [8,9]. In athletes, excessive stress increases the risk of injury and even acute illness onset [10]. In fact, multiple research studies in the 2000s and 2010s discovered that sports injuries in elite athletes are the accumulated result of physical and psychosocial stressors [10]. In addition to JM's game-related stress, the financial burden may have worsened his anxiety and contributed to his re-injury. To complete a holistic treatment plan, JM should also been spoken to about the financial burden in and the possibility in referring to a financial advisor or group therapist in the matters of his family's economic situation.

Sports-Related Anxiety and Sports Injuries

Approximately 3 to 7 million sports-related injuries arise in the US each year [11]. Accompanying these injuries are physical pain, fear of injury, and psychological impacts. One psychological phenomenon, informally termed SRA, has been explained through numerous models, with the following holding true: SRA affects performance; the effect on performance can be negative or positive, depending on the individual and context; the nature of the effect is a product of the individual's physiological, behavioral, and cognitive responses to the stressful sport context [11].

Although SRA is relatively novel topic, factors that lead to this kind of anxiety have major implications. More specifically, factors or stressors that lead to the development of SRA may contribute to sports-related injuries [11]. These factors include the intensity of sport, intensity of stressors, and athlete's personality, history, and coping mechanisms. An athlete's poor stress response to a situation increases his risk of SI, with anxiety itself being an athlete's personality trait that can lead to SI [11,12]. A 2017 critically appraised topic review concluded that 66% of studies found results supporting CTA – the tendency to experience stress in competitive sports contexts - as the most consistent factor associated with SIO [12]. Although CTA and SRA are different terms, multiple studies use them interchangeably. Interestingly, CTA can predict SIO only when considered in tandem with other psychosocial factors like worry, life stressors, and the efficacy of one's coping skills. Assessed alone, CTA does not have predictive value for SIO. Researchers attribute this finding to the multidimensional essence of the relationship between SIO and SRA.

In addition to competitive trait anxiety, PSSI has been proposed as a potential influencer of SIO. A prospective study conducted in the early 2000s with 434 hockey, soccer, and football players discovered that an athlete's PSSI, or fear of injury, increases the risk of SIO [13]. Later studies then revealed that PSSI is linked to neuroticism, which is closely associated with trait anxiety [14-17]. CTA, SRA, and PSSI are fairly novel terms, and further studies are needed to bolster the connections found between them and SIO.

Conclusion

In terms of JM's case, JM himself explained his unofficial SRA diagnosis by a psychologist and his own level of stress, concern, and worry regarding his responsibility for family finances. Paralleling past studies' findings, the combination of JM's SRA or CTA, stress levels, and ongoing worry may have contributed to his multiple, recurring sports injuries involving his MCL, ACL, and PCL. Although a causal relationship cannot be determined, his SRA and psychosocial stressors most likely increased his risk for SIO.

Summary

This case concerns a patient admitted for lack of ROM, weakness, and pain in his right knee due to a professional ice hockey injury. During his time in hospital, JM revealed invasive, anxious thoughts since graduating to an alternate player from a benched one. The surgeon admitted JM for a right knee open MCL repair with internal bracing, ACL and PCL reconstructions, and PRP injection. However, the possibility of JM's SRA playing a role in his susceptibility to injury during early season could not be ruled out. Past research detailing the connections between competitive trait or SRA and SIO provided further reasons for a psychiatric referral. The recommendation of a psychiatrist who specializes in athletic performance anxiety was made, in addition to a prescription for 6 to 12 weeks of sports rehabilitation.

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