CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Katherine J. Smith

Project Number

36423

Project Title

Brace Yourself

Abstract

Objectives/Goals

This project was executed in the hope of making a knee brace for a grade two medial collateral ligament tear. The goal was to make the brace adjustable so that it can be worn throughout the whole recommended healing time yet still allow support to the injured place. The initial thought was that if the knee is exposed to more and more flexibility as the injury heals it would reduce stiffness and uneasiness once the brace is removed therefore the knee would be less susceptible to further injury. Before building the brace, multiple materials were tested and compared, once the best material was found, the brace was built and tested for flexibility and support. Unfortunately there was no physical data collected by the tests on the brace; the data consisted of observations and questions for further exploration. However other tests were completed to further understand how the brace would work most efficiently. The force of each material was measured to determine which substance used to keep the knee supported while allowing flexibility would work best with the product. After analyzing the data the materials selected proved to be supportive, flexible, sturdy, and easy to switch in and out of the brace. This conclusion shows that the brace is flexible yet still provides support and can easily be used if someone was to suffer a grade two medial collateral tear.

Methods/Materials

To carry out this project I used a knee sleeve and two lengths of coupling. I constructed the knee brace by adding the coupling to both sides of the knee sleeve using wire as thread and seat belt strapping to hold the coupling in place.

Results

After experimenting with the brace and materials used in the brace, I determined that the knee brace was sturdy enough to stabilize the knee but still allowed for flexibility of the knee joint. This showed that the brace was effective and met the initial objective of creating a brace that allowed for both stability and flexibility.

Conclusions/Discussion

The project proved that with some modifications this brace or type of brace could be applied to real-world injuries. Based on my findings I think that more study and thought should be given to the treatment of grade 2 MCL tears. I also believe that adjustable braces would be effective for most knee injuries.

Summary Statement

I created a knee brace for a grade 2 MCL tear that proves to be helpful in the healing process because it allows support and flexibility throughout the healing process.

Help Received

Tom Kramer, a medical engineer helped by giving me suggestions to enhance my project. My dad helped me collect materials for my project. Ms. Shimshock, my science teacher, answered questions and provided guidance.

Preliminary