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Internet resources for Tommy John injuries: what are patients reading?

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Background: The quality of medical information on the Internet has come under scrutiny. This study investigates the quality, accuracy, and readability of online information regarding ulnar collateral ligament (UCL) injuries.

Methods: Three search terms ("elbow ulnar collateral ligament injury," "tommy john injury," and "pitcher's elbow") were entered into 3 Internet search engines. Three independent reviewers evaluated the content and accuracy of the information with a set of predetermined scoring criteria. Website quality was further assessed by the *Journal of the American Medical Association* benchmark criteria and Health on the Net Foundation certification. Website readability was ascertained with the Flesch-Kincaid score.

Results: We evaluated 113 unique websites. The average quality for all websites was 8.88 ± 6.8 (maximum, 32 points). Website quality and accuracy were lower with use of the search term "pitcher's elbow" as compared with "elbow ulnar collateral ligament injury" or "tommy john injury" ($P \leq .001$). Sites certified by the Health on the Net Foundation had higher quality scores than non-certified sites ($P = .034$). The mean reading grade level was 10.7. Reading level was significantly correlated with website accuracy and quality ($P \leq .001$) and physician authorship ($P = .012$). Forty-three websites (38.1%) described surgical reconstruction; of these, 16 (37.2%) mentioned improved pitching performance postoperatively.

Conclusions: Online information on UCL injuries is often inaccurate and written at an inappropriate reading level. Information quality depends on the search term used, website authorship, and commercial bias. Clinicians must be aware of factors influencing website quality in order to direct patients to appropriate resources.

Level of evidence: Survey of Materials—Internet; Education Methodology Study

Keywords: Tommy John; ulnar collateral ligament; Internet; patient education; health literacy; online education; readability

Since the first Tommy John surgery in 1974, ulnar collateral ligament reconstruction (UCLR) of the elbow has become a common procedure.[19,25] There has been an estimated 10-fold increase in reconstruction procedures in the first decade of the 21st century, and a quarter of all Major League Baseball pitchers have undergone the procedure at least once.[11,14,25,27,37] Evidence suggests that this trend has translated to adolescent athletes, with a 50% increase in UCLR in high school baseball players aged 15 to 19 years.[19,25,40]

The success of Major League Baseball pitchers guides the public perception of UCLR and may hinder compliance with injury-prevention guidelines. When high school baseball teams were surveyed, 31% of coaches and 28% of players did not believe the number of pitches thrown to be a risk factor for

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ulnar collateral ligament (UCL) injury.[1] In addition, 51% of players and 37% of parents believed the operation should be performed in the absence of an injury to enhance pitching performance.[1] The availability of high-quality, accurate information is paramount in providing accurate counseling to and setting realistic expectations for patients and families considering UCLR.

The Internet has become an increasingly important source of medical information. In a large survey, 72% of respondents had used the Internet to research a health-related issue in the past 12 months.[13] As the Internet is a nonregulated resource, without a standard of quality or professional peer review, there is concern regarding the quality and accuracy of information available.[15,16,22,23] Furthermore, a considerable number of websites combine health information with commercial motives, potentially biasing information.[17,51]

This study investigates the quality and accuracy of available online information pertaining to elbow UCL injuries. We hypothesized that the quality and accuracy of UCL injury information available on the Internet would vary with the search term used and that most information would be written at a higher reading level than that recommended for the general population.

Methods

During this website investigation, we selected 3 search terms to represent those chosen by patients with an UCL injury: "elbow ulnar collateral ligament injury," "tommy john injury," and "pitcher's elbow." Each of the 3 search terms was entered as written, without the addition of any other words for specification, into 3 search engines (Google, Yahoo, and Bing) on December 25, 2015. These search engines were chosen because they represent over 90% of searches performed on the Internet.[20,23] We evaluated the first 25 results from each search. After duplicates were eliminated, 132 websites remained (Fig. 1). Nineteen websites were excluded because they lacked informational content (n = 4), only included video content (n = 5), were unrelated to elbow collateral ligament injuries (n = 4), or contained materials intended for peer review (n = 6). Ultimately, 113 sites met the inclusion criteria and underwent blinded assessment.

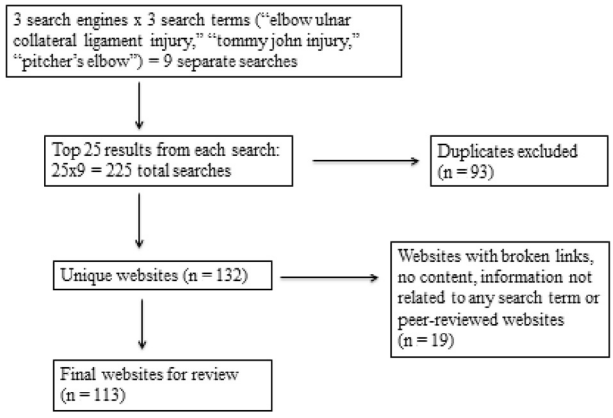

Figure 1 After initial analysis, 225 searches were obtained. After application of the exclusion criteria (duplicate sites, broken links, no content, unrelated information, and peer-reviewed sites), a total of 113 unique sites remained. These 113 websites were used to score and analyze online elbow ulnar collateral ligament injury websites.

The accuracy and quality of the websites were assessed by methods similar to those used by previous investigators for scoliosis,[31] back pain,[31] shoulder instability,[23] lateral epicondylitis,[16] hip dysplasia,[22] and fractures of the distal radius.[15] As such, 32 items that included elements of diagnosis, anatomy, treatment plan, and complications specific to UCL injuries, based on guidelines written by the American Academy of Orthopaedic Surgeons[2] and a position statement from the American Sports Medicine Institute,[3] were included in the quality grading sheet (Table I).

Website quality was scored by awarding 1 point per criterion contained on the website, with a maximum score of 32 points.[6,43] Three orthopedic surgery residents were trained by the senior author (J.S.D.) in the evaluation of quality and accuracy of website information,

Table I Scoring criteria

Diagnosis and evaluation
Describes anatomy of elbow
Describes location of ulnar collateral ligament
Describes function of ulnar collateral ligament
Commonly occurs in throwers
Caused by overuse or repetitive high stresses
May be caused by acute trauma/elbow dislocation
A symptom is pain on inside/medial elbow
You may have decreased throwing velocity
Injury often associated with a "pop" in elbow
You may have ulnar nerve symptoms
Physician may perform valgus stress test
Physician may order MRI
Injury may be prevented by limiting number of pitches
Treatment and rehabilitation
Treatment begins with rest
Physical therapy and strengthening may be helpful
Evaluation of throwing mechanics may be recommended
Nonoperative treatment includes oral anti-inflammatories
Surgery if acute, complete tear in high-level athletes
Surgery if failed nonoperative management
Surgery involves UCL reconstruction
Patient's own tendons used for reconstruction
Mentions autograft sites
Pitching performance discussed after reconstruction
Physical therapy is required after surgery
Gradual increase in throwing distance and velocity
Progressive throwing program initiated at 4-6 mo
Patients must avoid valgus stress for 4-6 mo postoperatively
Complications and outcome
Risk of nerve injury with surgery
Inability to regain preinjury throwing ability
Mentions other complications of surgery (including infection, fracture, and stiffness)
High rates of return to preinjury level with operative treatment
Average time to return to competitive throwing: 9-12 mo

The maximum total score is 32 points.
MRI, magnetic resonance imaging; UCL, ulnar collateral ligament.