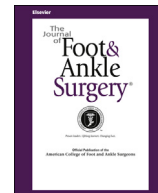




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## Is the Internet a Reliable Source of Information for Patients Seeking Total Ankle Replacement?



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### ABSTRACT

The modern patient population relies on the Internet to provide knowledge about medical procedures. However, a gap between established medical guidelines and the information provided on the Internet exists. Because of the general poor quality of the medical information available on the Internet and the increasing popularity of total ankle replacement (TAR) with its known potential serious complications, we undertook the present study to evaluate the information on TAR available to the general public through the Internet and to determine the quality of information according to authorship type and site certification status. Three common search engines were used to identify a total of 105 websites. The TAR information quality was rated as “excellent,” “high,” “moderate,” “low,” or “unacceptable.” The sites were evaluated for authorship or sponsorship, content, and other criteria. The data were analyzed as a complete set, as a comparison among authorship types (academic, private, industry, or other), and by certification status. Websites with scores of excellent or high were 35% of the sites reviewed, and 48% were ranked as poor or unacceptable. Of the authorship types, the highest quality authorship was for the industry and other sites, which rated high or excellent 46% of the time. Eight percent of the sites evaluated were certified; however, certification status was not associated with improved information quality. Our study has demonstrated a low quality of TAR information available across all website types, regardless of authorship type. We suggest a partnership between professional organizations and physicians to ensure that provider websites reflect the current indications and contraindications of TAR to enhance patient education.

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The modern patient population is relying more heavily on the Internet to provide themselves with knowledge about medical procedures before seeking a physician’s advice (1). Several studies have attempted to replicate patients’ Internet search experience for a variety of orthopedic conditions and procedures to determine the reliability of information obtained from their web searches (2–8). The results of those studies have shown a gap between established medical guidelines and the information provided by the websites.

End-stage ankle arthritis has traditionally been treated with arthrodesis of the affected joint, and this is still considered the

reference standard for treatment of this pathologic entity (9). Arthrodesis consistently reduces ankle pain but also reduces mobility in the limb. It also increases the likelihood of painful arthritis in the surrounding midfoot/hindfoot complex. In response to this problem, industry and surgeons working together have developed total ankle replacement (TAR) prosthesis systems. These prostheses have allowed patients to retain some of the ankle joint range of motion but with a high incidence of complications (10,11). What is clear is that careful attention must be given to proper patient selection. If the patient is not an appropriate candidate and the TAR fails, the sequelae can be as serious as below-the-knee amputation of the affected extremity. Even with these limitations, TAR has become an increasingly popular option for treating end-stage ankle arthritis (9).

Because of the general poor quality of medical information available on the Internet and the increasing popularity of TAR with its known potential serious complications, we undertook the present study to evaluate and analyze the information on TAR available to the general public through the Internet and to determine whether the

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quality of information varies according to authorship type and site approval by a certification body.

## Materials and Methods

We sought to mimic the common patient experience searching for information pertaining to TAR to assess the reliability of Internet information for the purpose of patient self-education. We erased our Internet browsers of all search history, cookies, and cached data to eliminate potential search biases from previous medical-related searches performed on our browsers. Furthermore, to the best of our abilities, we disabled all location services for the browser and each search engine used. Google (<http://www.google.com>; Mountain View, CA), Yahoo! (<http://www.yahoo.com>; Sunnyvale, CA), and Bing (<http://www.bing.com>; Bellevue, WA) were used to perform our search using the general query “total ankle replacement.” The use of this query returned more than 13 million sites combined among these 3 search engines. The first 35 unique sites returned by each search engine were identified and evaluated for a total of 105 sites included in our study. The number of sites we reviewed was consistent with that of a previously published study that used a similar search strategy (7). We evaluated each site only once. All redundant sites within a single search engine were evaluated only once. Identical sites, each with a different uniform resource locator, were evaluated only once. Also evaluated only once were redundant sites common to the 3 search engines. Finally, we excluded any sites that directly linked to clinical trials published in academic journals.

The total number of appropriate indications, candidate criteria, absolute and relative contraindications, benefits, risks, and alternative treatments listed by each site were recorded. For a site to receive credit for including a criterion it had to include at least 1 descriptor in the criteria (Table 1). If the sites referenced any aspect of nonlisted criteria, it was recorded as “other.” Additionally, we recorded in binary fashion if any criteria were stated. Whether alternative treatments were discussed as options to consider in lieu of TAR or as options for conservative medical therapy before TAR were not differentiated.

Using an observational method of analysis, the information provided by each site was then analyzed. It was noted whether the sites provided specific reference to peer-reviewed data. We also evaluated the sites for the presence of illustrations or images outlining the steps of the TAR procedure, a step-by-step description of the surgical technique, and a postoperative recovery description. We recorded whether sites provided any method of appointment scheduling for TAR consultation.

After all content data collection was performed for each site, that site was assigned a level of information quality according to several criteria: indication, contraindication, benefit, risk, alternative, description, peer-reviewed data, and postprocedure recovery. These criteria were chosen on the basis of the elements of the U.S. Food and Drug Administration Department of Health and Human Services Informed Consent for Human Subjects (21CFR50.25, as amended January 4, 2011; available at: <http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcr/CFRSearch.cfm?fr=50.25>; last accessed: August 11, 2014) and other factors a patient would consider when making an informed decision. A site received an “excellent” rating if it included 7 or 8 information quality criteria; a “high” rating if it included 6 information quality criteria; a “moderate” rating if it included 5 information quality criteria; a “poor” rating if it included 4 information quality criteria; and an “unacceptable” rating if it included 3 or fewer information quality criteria.

In our second step in the analysis, the sites were categorized into 4 groups: academic, private, industry, or other. Academic sites were those sponsored by either an accredited university or a university-affiliated healthcare institution. Private sites were either authored by a physician or physician group operating in private practice or edited by a physician or group of physicians operating for a private company or institution. Industry sites were those designed and sponsored by biomedical device companies. Other sites included general online health databases, TAR-specific sites not edited or sponsored by a private physician, private patient-authored blogs, and sites developed and sponsored by insurance companies. After authorship classification, we compiled data for each authorship group.

During the final step in our analysis, the sites were classified according to certification status. The specific certifying body was noted.

## Results

The overall quality of information available on the Internet to the layperson was not good. Of the 105 sites reviewed, 19% were ranked excellent, 16% high, 14% moderate, 14% poor, and 34% unacceptable. At least 1 indication for TAR was listed in 71% of sites, and 35% of the sites listed an absolute or relative contraindication. The trend was to point the person toward TAR, with benefits expressed by 66% of sites but risks outlined in only 39%. The most common benefits cited were pain reduction and improved mobility about the ankle joint, both cited at

**Table 1**  
Descriptors of considered criteria

<b>Indications</b>	
	Primary arthritis
	Post-traumatic arthritis
	Secondary arthritis
	Failed arthrodesis
	Other
<b>Candidate criteria</b>	
	Middle to old age
	Independently mobile
	No significant comorbidities
	Normal or low body mass index
	Adequate bone stock
	Well-aligned and stable hindfoot
	Good soft tissues condition
	No neurovascular impairment of the lower extremities
	Bilateral end-stage ankle osteoarthritis
	Previous hindfoot and/or midfoot arthrodesis
	Other
<b>Absolute contraindications</b>	
	Neuroarthropathy (Charcot foot)
	Noncorrectable hindfoot alignment
	Massive joint laxity
	Highly compromised periarticular soft tissue
	Severe sensory or motor dysfunction of the foot or ankle
	Active soft tissue or bone infection
	High levels of functional demands
	Other
<b>Relative contraindications</b>	
	Severe osteoporosis
	History of osteomyelitis
	Diffuse osteonecrosis
	Significant bone defect on tibial or talar site
	Previous long-term immunosuppressive use
	Heavy physical work
	Medium level of sport participation
	High body mass index
	Diabetes mellitus
	Tobacco abuse
	Varus or valgus ankle >10°
	Avascular necrosis of the talus
	Other
<b>Benefits</b>	
	Pain reduction
	Improved mobility
	Reduce strain on surrounding joints
	Perform activities of daily living
	Regain athletic activities
	Option to revise to a ankle arthrodesis
<b>Risks</b>	
	Metallic component aseptic loosening
	Infection
	Pseudoarthrosis of distal syndesmosis arthrodesis (only relevant for Agility® and Agility® LP Total Ankle Replacement systems, DePuy, Warsaw, IN)
	Malunion
	Gait abnormality
	Long recovery period
	Additional surgery
	Arthritis in surrounding joints
	Intraoperative fractures
	Postoperative fracture
	Delayed incision healing
	Metallic component subsidence
	Other
<b>Alternative treatment</b>	
	Ankle arthrodesis
	Nonsteroidal anti-inflammatory drugs or analgesics
	Corticosteroid injections
	Hyaluronic acid injections
	Below-the-knee amputation
	Ankle foot orthosis
	Weight loss
	Activity restriction

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