

## The poor quality and reliability of information on periacetabular osteotomy on the internet in Japan

Yasuhiko Takegami<sup>1</sup>, Taisuke Seki<sup>1</sup>, Takafumi Amano<sup>1</sup>, Yoshitoshi Higuchi<sup>1</sup>, Daigo Komatsu<sup>1</sup>, Yoshihiro Nishida<sup>1</sup> and Naoki Ishiguro<sup>1</sup>

<sup>1</sup>*Department of Orthopaedic Surgery, Nagoya University Graduate School of Medicine, Nagoya, Japan*

### ABSTRACT

Although many patients use the internet to access health-related information, the quality and the reliability of the information is highly inconsistent. Periacetabular osteotomy (PAO) is one of the surgical procedures for hip dysplasia. However, medical information on PAO is limited on the internet. This study aims to evaluate the quality and reliability of information available on PAO on the internet in Japan. A web search was conducted on two search engines for the following terms: “hip osteotomy,” “pelvic osteotomy,” and “osteotomy for hip preservation” in Japanese. In total, we found 120 websites. To determine the quality and reliability of information on each website, we used the Health on the Net Foundation (HON) score, the Brief DISCERN score, and an osteotomy-specific content (OSC) score. After eliminating duplicate websites, we reviewed 49 unique websites. Only three websites (6.1%) had good reliability, as indicated by their HON scores. Twelve websites (24.4%) had good-quality information, as measured by their Brief DISCERN scores. As evaluated by their OSC scores, physician websites were found to be biased toward etiology and surgical indication and did not provide information on the complications of procedures. Non-physician websites were generally insufficient. The information about PAO on the internet is, therefore, unreliable and of poor-quality for Japanese patients.

**Keywords:** hip dysplasia, periacetabular osteotomy, internet, health information

This is an Open Access article distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License. To view the details of this license, please visit (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

### INTRODUCTION

Hip dysplasia patients experience hip pain as a result of the instability of the hip joint and the overloading of the acetabular rim.<sup>1)</sup> Hip dysplasia prevalence ranged from 5.4% to 12.8% in a large population-based survey.<sup>2)</sup> Periacetabular osteotomy (PAO) is accepted as a surgical procedure for hip dysplasia.<sup>3)</sup> It is capable of preventing the progression of osteoarthritis, providing pain relief, and improving hip function in patients with symptomatic hip dysplasia. Additionally, by rotating the acetabular fragment, changing the load direction, and expanding the load area, this operative procedure aims to reduce the burden on the cartilage and stabilize the hip joint.<sup>4,5)</sup> However, the perioperative complication rate of PAO has been reported as ranging from 6%

---

Received: March 6, 2017; accepted: May 31, 2017

Corresponding author: Yasuhiko Takegami, M.D., Ph.D.

Department of Orthopaedic Surgery, Nagoya University Graduate School of Medicine, Nagoya, 65 Tsurumai-cho, Showa-ku, Nagoya 466-8550, Japan

Phone: +81-52-741-2111, fax: +81-52-744-2260, e-mail: [takegami@med.nagoya-u.ac.jp](mailto:takegami@med.nagoya-u.ac.jp)

to 46%.<sup>6-8)</sup> Generally, well-trained surgeons perform PAO, which is known to be a technically demanding procedure. Thus, medical information on PAO has been limited to professional publications and physicians' offices. There was an information gap between physicians and patients.

A recent survey revealed that more than 102 million Japanese people—82.8% of the population—have internet access<sup>9)</sup> and over 61% of adults regularly use the internet for health-related information.<sup>10)</sup> Patients utilize the internet as a resource for information on diseases, treatments, and outcomes. Patients require access to high-quality, evidence-based information to actively participate in decisions about their own care.

However, the quality and content of information on health on the internet is highly inconsistent.<sup>11)</sup> Several studies have evaluated the quality of information related to adult hip diseases available on the internet<sup>12-15)</sup> including information on total hip arthroplasty, femoroacetabular impingement, and hip arthroscopy. PAO for hip dysplasia, to our knowledge, has not been included in any such study. Thus, this study aims to evaluate the quality and reliability of information on PAO available on the internet for Japanese patients.

## MATERIALS AND METHODS

This study was exempt from our institution's research ethics boards because no patient data were used.

### *Search strategy*

Figure 1 shows the flow diagram of the search strategy used. All evaluated websites were required to be in Japanese and to be freely available to the public. Google.co.jp and Yahoo.co.jp were the search engines selected for review. These two search engines are reportedly used for 90% of all internet searches in Japan.<sup>16)</sup> The following Japanese search terms were analyzed in each search engine: *kokansetsu kotsukirijutsu* (hip osteotomy), *kotsuban kotsukirijutu* (pelvic osteotomy), and *kokansetsu jikotsu syujutu* (osteotomy for hip preservation). The top 20 search results for each term identified by each search engine were selected, resulting in a total of 120 websites. A similar methodology was also used in a prior study.<sup>17)</sup> All searches were performed on May 27, 2016. We printed out these websites to evaluate them.

### *Information provider*

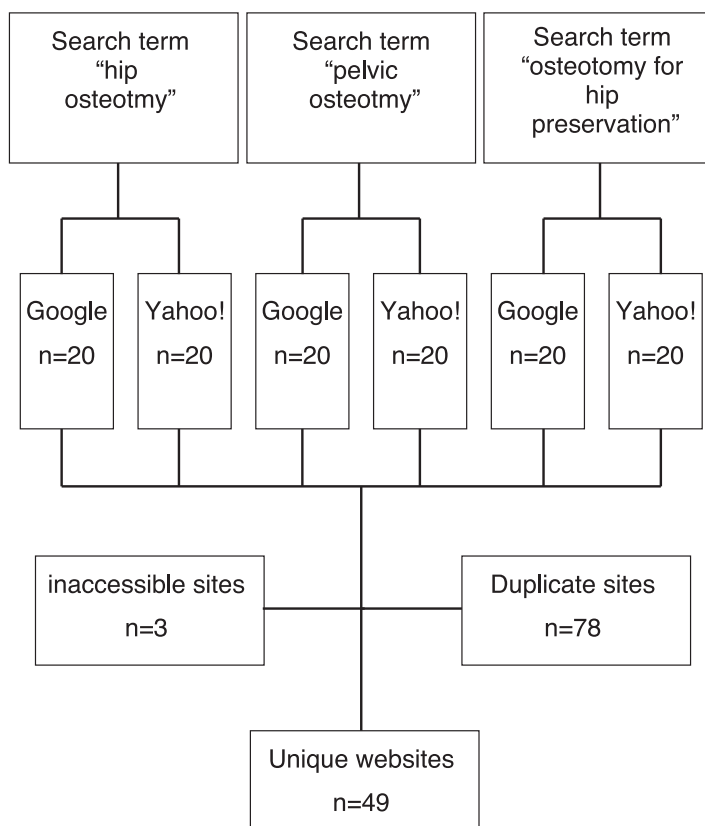
Following an evaluation, the content providers of each website were categorized as "Academic" (which included academic societies and universities), "Industry," "Physician" (which included hospitals), "Non-physician" (which included allied health professionals), "Patient," "Governmental and Nonprofit Organizations (NPO)," or "Unspecified," based on previous works.<sup>12)</sup>

### *Website evaluation*

#### *Health on the Net Foundation (HON) score*

We evaluated each website according to the HON criteria. HON is an NPO that seeks to improve the quality of health-related information on the internet. The group monitors the transparency of health websites with respect to information and purpose.<sup>18)</sup> The HON score primarily includes the following ethical aspects: author credentials, last-modified date of clinical documents, confidentiality of data, source data references, funding, and advertising policy (Table 1). We calculated each website's HON score based on the method proposed by Winship.<sup>19)</sup> The HON score has a maximum of 16 points: 5 points for transparency of information, including accessibility and valid contact details; 5 points for referencing authors' credentials; 3 points for

## PAO information on the internet



**Fig. 1** Internet search strategy flow diagram

**Table 1** Health on the Net Foundation Code of Conduct (HONcode) principles\*

HONcode principles	Description
1. Authoritative	Indicate the credentials of the authors
2. Complementarity	Support, not replace, the physician-patient relationship
3. Privacy	Respect the site visitor's privacy and confidentiality regarding any personal data submitted
4. Attribution	Cite the source(s) of published information, data, and medical and health pages
5. Justifiability	Back up claims relating to benefits and performance
6. Transparency	Present accessible, accurate e-mail contacts
7. Financial disclosure	Identify funding sources
8. Advertising policy	Clearly distinguish advertising from editorial content

\* Reproduced from Health on the Net website (<https://www.healthonnet.org/>)

accountability; 1 point for the privacy policy for user information; 1 point for referencing when the information was last updated; and 1 point for accessibility. A HON score of 12 or more out

**Table 2** Brief DISCERN score

Question	Description
1. Is it clear what sources of information were used to compile the publication?	Sources used, such as a reference list
2. Is it clear when the information used or reported in the publication was produced?	Date of publication and updating
3. Does it describe how each treatment works?	The treatment mechanism
4. Does it describe the benefits of each treatment?	The positive side of the treatment
5. Does the publication describe the risks of each treatment?	The negative side of the treatment
6. Does it describe how the treatment choice affects the overall quality of life?	The effects of the treatment on daily life

**Table 3** Osteotomy-specific content (OSC) score criteria

Satisfactory: 1 point, Unsatisfactory: 0 points
1. Etiology of hip dysplasia and osteoarthritis of hip
2. Diagnosis
3. Alternative: observation and conservative treatment
4. Surgical indication
5. Operative complications (e.g. bleeding, thromboembolism, infection, nerve palsy, chronic pain, or osteoarthritis progression)
6. Outcomes
7. Rehabilitation and the length of hospital stay
8. References
9. Alternative: total hip arthroplasty

of 16 indicates a good-reliability website.<sup>19)</sup>

#### *Brief DISCERN score*

The DISCERN instrument, initially funded by the National Health Service of the United Kingdom, was designed to assess the quality of information on health-related websites.<sup>20)</sup> The Brief DISCERN score is a modified and easy-to-use version of the DISCERN instrument with established reliability and validity.<sup>21)</sup> The Brief DISCERN score has six items graded on a five-point scale for a maximum score of 30; two of those items involves reliability, while the other four evaluate website content (Table 2). A Brief DISCERN score of 16 or more out of 30 indicates good quality.<sup>21)</sup>

#### *Osteotomy-specific content (OSC) Score*

To evaluate the content of each website, we developed the OSC score based on the hip arthroscopy-specific score.<sup>12)</sup> The OSC score comprises nine elements specific to PAO (Table 3). We used a binary evaluation system where an observer determines whether the websites' contents were satisfactory or unsatisfactory in relation to several criteria. Each criterion was deemed satisfactory if the website met the minimum content requirements described below. The maximum OSC score is 9 points: 1 point for each satisfactory criterion and 0 for unsatisfactory criteria.

The minimum content requirements take into consideration discussions on etiology that include the etiology of hip dysplasia as the most common cause of secondary osteoarthritis of the hip. Further, discussions on diagnosis may include the symptoms of hip osteoarthritis and radiographic features of hip dysplasia. Possible differential diagnoses of hip pain, such as femoroacetabular impingement, must be mentioned. Discussions on conservative treatment may include references to medication, lifestyle modification, and weight loss. Surgical indication is considered to be discussed when physical examination data and radiographic evidence are provided. Discussions on possible complications include references to the general risks associated with any major surgical procedure or issues specific to PAO such as neurovascular damage, necrosis of the femoral head, and osteoarthritis progression. PAO outcomes must also be mentioned. Discussions on outcomes must include clinical evaluations and quality-of-life assessments of patients who undergo PAO. A postoperative rehabilitation program must be discussed. In addition, clarification on the length of hospital stay for this procedure should be discussed as this could be considered a disadvantage of PAO. The websites must provide specific references to peer-reviewed publications for information concerning hip osteotomy. Total hip arthroplasty must be mentioned as the most effective alternative procedure for hip osteoarthritis.

#### *Statistical analysis*

The HON, Brief DISCERN, and OSC scores were not normal distribution based on the Shapiro-Wilk test. The Kruskal-Wallis test was used to determine whether a website category scored higher HON, Brief DISCERN, and OSC scores. Bonferroni's post-hoc test was used to compare the different means. P-values less than 0.05 were considered statistically significant.

In addition, two orthopedic physicians evaluated these websites independently. To investigate intraobserver reliability, the HON, Brief DISCERN, and OSC scores of 20 randomly selected websites were measured at two-week intervals. The observers were unaware of the results of the other's measurements. We averaged the scores of the two observers. Interobserver and intraobserver reliability scores were calculated using the interclass coefficient correlation (ICC). We considered ICC values of or greater than 0.7 as indicators of acceptable reliability.<sup>19)</sup> A statistical analysis was performed using the EZR (Saitama Medical Center, Jichi Medical University).<sup>22)</sup>

## RESULTS

Of the 120 websites, 78 duplicate and 3 inaccessible websites were removed, and the remaining 49 unique websites were evaluated (Table 4). There were 4 Academic, 11 Physician, 10 Non-physician, 12 Patient, 3 Industry, 1 NPO, and 8 Unspecified websites. The overall scores by website type are indicated in Table 5.

**Table 4** List of unique websites analyzed

URL
<a href="http://www.jikeiseikei.com/orthopedics/groin/index.html">http://www.jikeiseikei.com/orthopedics/groin/index.html</a>
<a href="https://hosp.gifu-u.ac.jp/seikei/shinryou/kokansetsu.html">https://hosp.gifu-u.ac.jp/seikei/shinryou/kokansetsu.html</a>
<a href="http://kompas.hosp.keio.ac.jp/contents/000189.html">http://kompas.hosp.keio.ac.jp/contents/000189.html</a>
<a href="http://www.yu-orthop.jp/group/hipgroup.html">http://www.yu-orthop.jp/group/hipgroup.html</a>
<a href="http://yanagawa.kouhoukai.or.jp/inoue/p01.html">http://yanagawa.kouhoukai.or.jp/inoue/p01.html</a>
<a href="http://www.kyushuh.johas.go.jp/bumon/c_kansetsusaiken.html">http://www.kyushuh.johas.go.jp/bumon/c_kansetsusaiken.html</a>
<a href="http://www004.upp.so-net.ne.jp/take-dr/">http://www004.upp.so-net.ne.jp/take-dr/</a>

<http://www.nho-kumamoto.jp/kusu-press/kusu-171-01.html>  
[https://www.tokaihp.jp/center/hipcenter/xray\\_pic.html](https://www.tokaihp.jp/center/hipcenter/xray_pic.html)  
<http://www.sapporo-hosp.com/medical/medical-01.php>  
<http://www.med.jrc.or.jp/hospital/clinic/tabid/164/Default.aspx>  
<http://www.kanariha-hp.kanagawa-rehab.or.jp/osteoarthritis-top/>  
<http://nagoya-seikei.com/s0108kokansetu-syujyutu.html>  
[http://www.hokkaido-seikei-kinen.jp/surgeys\\_cat/surgey\\_hipjoint](http://www.hokkaido-seikei-kinen.jp/surgeys_cat/surgey_hipjoint)  
[http://osaka.jcho.go.jp/onzon\\_mata/](http://osaka.jcho.go.jp/onzon_mata/)  
<http://ginzaplus.com/jp/>  
<http://rebody2015.com/voice/type/hip-joint/>  
<http://nenoshiroishi.com/kokansetu/kokansetu1.html>  
<http://kokansetsu-itami.com/kyuugaikeisei/5192/>  
<http://o-hara.tokyo/2015/04/951>  
[http://www.juzen.net/nayami-genin/hip\\_joint\\_pain/](http://www.juzen.net/nayami-genin/hip_joint_pain/)  
<http://blog.goo.ne.jp/mm1110mm/c/b6527b98c2ac84fb055e052d3c8b2845>  
<http://www.pst-sharom.com/index.php>  
<http://www.ms-takasaki.com>  
<http://www.shin-atsu-nagoya.com/kansetsu.html>  
<http://majyo3com.ddo.jp/kokansetsu/kokan-2.htm>  
<http://ameblo.jp/kansetuitai/theme-10040706448.html>  
<http://ameblo.jp/tg12/>  
<http://monomimado.exblog.jp/>  
<http://ameblo.jp/momiji941008/entry-11315871910.html>  
<http://kokansetsu.exblog.jp/11729140/>  
<http://blog.goo.ne.jp/fukurooufoo/e/fbde2b3b8696efa487fdaaea832c73a9>  
<http://ganbare-meron.dreamlog.jp/archives/1153956.html>  
<http://hanatamashinju.blog24.fc2.com/blog-entry-75.html>  
<http://74744989.blog.fc2.com/blog-entry-82.html>  
<http://ikuranet.chu.jp/tobyosyujutu.html>  
<http://sokugaku.com/henkosho/>  
<http://www.kansetsu-itai.com/doctor/doc016.php>  
<http://www.kansetsu-itai.com/about/hip/treatment/operation/osteotomy/ost005.php>  
<http://www.jinko-kansetsu.com>  
<http://www.npo-nozomikai.jp/info-henkeisei.html>  
<http://www004.upp.so-net.ne.jp/take-dr/chiryos/RAO/how/how.htm>  
[http://koshiitai.com/kokan/syujutu\\_kotukiri.html](http://koshiitai.com/kokan/syujutu_kotukiri.html)  
<http://momiji.news.coocan.jp>  
<http://ameblo.jp/okakokacafe/>  
<http://healthil.jp/13563>  
<http://www.k2.dion.ne.jp/~mailhime/about-kokansetu.html>  
<http://hipjoint.soc.or.jp/hospi.html>  
[http://www.geocities.jp/espa\\_paso/page035.html](http://www.geocities.jp/espa_paso/page035.html)

---

**Table 5** Summary of websites scores

	Academic	Physician	Non-physician	Patient	Industry	NPO	Unspecified
Number of websites	4	11	10	12	3	1	8
HON score; median (range)	7 (2–8)	9 (6–13)	5 (1–8)	4 (2–9)	10 (9–13)	9 (NA)	5 (3–6)
Brief DISCERN score; median (range)	10 (7–24)	14 (6–22)	7.5 (6–19)	11.5 (0–20)	13 (11–21)	6 (NA)	15 (9–21)
OSC score; media (range)	5.5 (2–6)	5 (2–6)	0.5 (0–6)	2.5 (0–6)	3 (2–5)	5 (NA)	6 (1–8)

NA: not available

### *HON score*

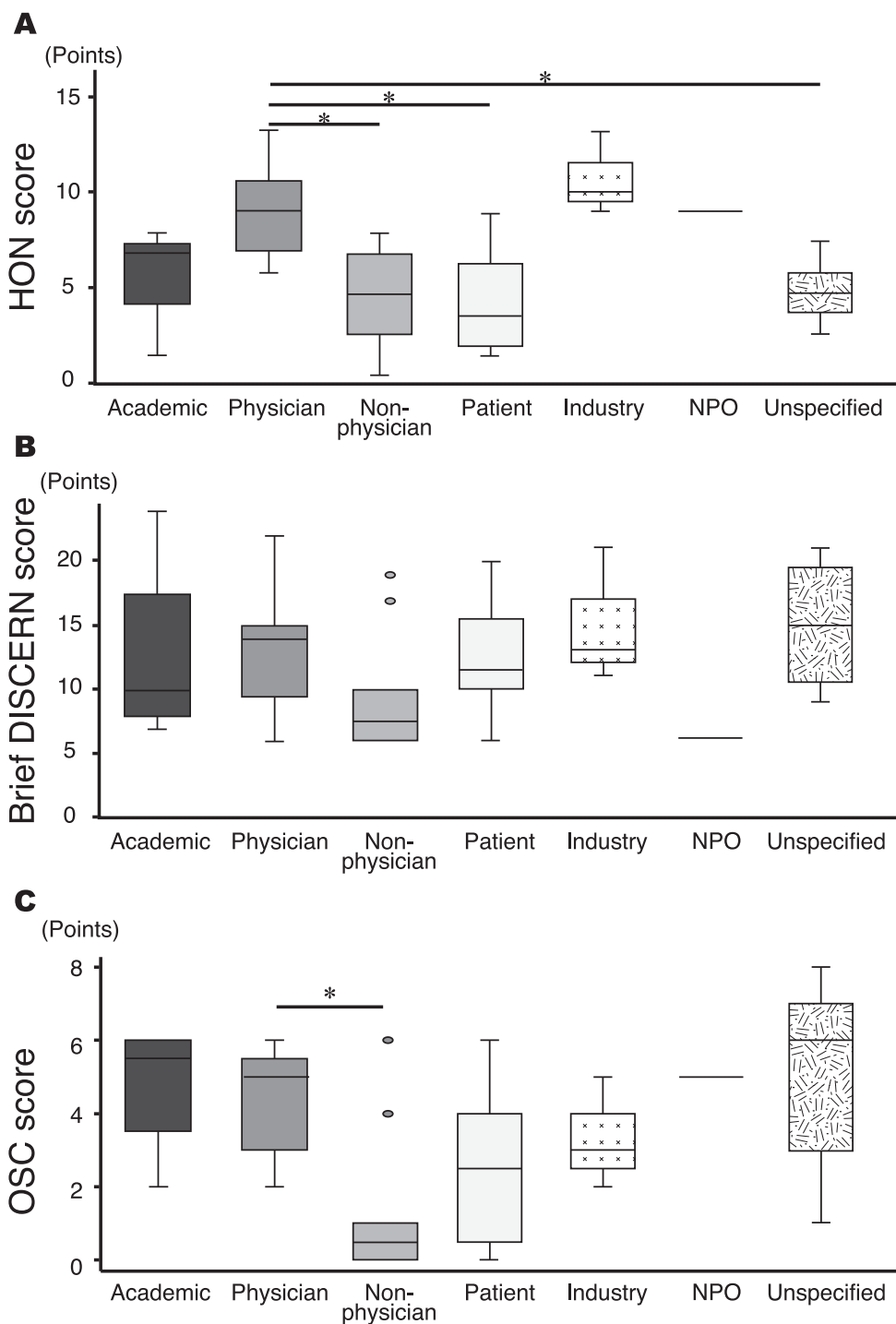
The HON score for PAO websites ranged from 1 to 13 points out of a maximum of 16. The median HON score was 6, significantly below the score of 12, which indicates high quality. Only three websites (6.1%; one Industry and two Physician websites) scored higher than 12 points. Patient websites had the lowest HON scores. The HON score for Physician websites was higher than that of Non-physician, Patient, and Unspecified websites (Figure 2A). Intraobserver ICC was 0.76 [95% confidence interval (CI): 0.55–0.82], while interobserver ICC was 0.71 [95% CI: 0.46–0.86].

### *Brief DISCERN score*

The median Brief DISCERN score for all websites was 11 out of a maximum score of 30 (ranging from 0 to 24), where 16 or more points indicated good quality. Only 12 websites (24.4%) scored higher than 16 points: one Academic, two Physician, two Non-physician, three Patient, one Industry, and three Unspecified websites. No significant differences were found among these website categories (Figure 2B). Intraobserver ICC was 0.77 [95% CI: 0.60–0.80], while interobserver ICC was 0.71 [95% CI: 0.49–0.85].

### *OSC score*

The OSC score ranged from 0 to 8 points out of a maximum score of 9. The median OSC score was 3. The OSC score of Non-physician websites was lower than that of Physician websites (Figure 2C). Table 6 showed the number of satisfactory websites in each question of the OSC score for each information provider. No literature references were provided on any of the websites. The content of Non-physician websites was generally insufficient. Physician websites mentioned the etiology of hip dysplasia and surgical indication for PAO in detail. However, their content ignored operative complications. Intraobserver ICC was 0.66 [95% CI: 0.40–0.88], while interobserver ICC was 0.68 [95% CI: 0.46–0.90].



**Fig 2** Each score by category

(A) Health on the Net Foundation (HON) score, (B) Brief DISCERN score, (C) Osteotomy-specific content (OSC) score. \*P < 0.05 by Kruskal-Wallis test followed by Bonferroni's post-hoc test.



**Table 6** The number of satisfied websites in each item of the OSC score for each information provider

	Academic	Physician	Non-physician	Patient	Industry	NPO	Unspecified
Number of websites	4	11	10	12	3	1	8
Etiology	4 (100%)	8 (72.7%)	4 (40%)	6 (50%)	2 (66.7%)	1 (100%)	6 (75.0%)
Diagnosis	4 (100%)	7 (63.6%)	1 (10.0%)	4 (33.3%)	0 (0%)	1 (100%)	8 (100%)
Conservative treatment	3 (75.0%)	7 (63.6%)	2 (20.0%)	3 (25.0%)	1 (33.3%)	1 (100%)	7 (87.5%)
Surgical indication	3 (75.0%)	9 (81.8%)	1 (10.0%)	2 (16.7%)	3 (100%)	1 (100%)	6 (75.0%)
Operative complications	0 (0%)	0 (0%)	2 (20.0%)	5 (41.7%)	1 (33.3%)	0 (0%)	4 (50.0%)
Outcomes	0 (0%)	2 (18.2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (12.5%)
Rehabilitation	1 (25.0%)	3 (27.3%)	0 (0%)	3 (25.0%)	0 (0%)	0 (0%)	1 (12.5%)
References	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

## DISCUSSION

Our study evaluated online information about PAO and judged it utilizing the HON, Brief DISCERN, and OSC scores. The number of reliable PAO websites, which were evaluated by their HON scores, was small. The quality of many internet websites addressing PAO, which was measured by Brief DISCERN and OSC scores, was low.

The transparency indicated by the HON score on most websites on PAO in our study is not ensured. Only 6.1% of all websites are considered reliable websites providing information on PAO. Winship *et al.* reported that 15 out of 98 websites (15.3%) achieved an HON score of 12 or more points for pediatric orthopedic content.<sup>19)</sup> For orthopedic sports medicine, 44 out of 154 sites (28.6%) scored higher than 12 points.<sup>11)</sup> These studies were conducted in the context of the United States. In Japan, there may be limited knowledge on developing reliable websites that can provide patients with medical information. Although, these prior studies in the United States assessed general information for orthopedics, our study evaluated information on PAO, which is specialized hip surgery.

For the Brief DISCERN score, only 12 websites (24.4%) could be considered high quality. The OSC score of Non-physician websites was lower than that of Physician websites. Most of the Non-physician website content regarding PAO had potentially important, serious, or extensive shortcomings (Table 6). Physician and Academic websites was biased toward the etiology of hip dysplasia and surgical indications, but ignored operative complications. Kwong *et al.* reported that many websites providing information on hip resurfacing emphasized the advantages of the procedure but did not mention its disadvantages or complications.<sup>23)</sup> Physician and Academic websites should include information on outcomes, including information on the negative outcomes associated with PAO.

Our study has several limitations. First, since the attributes and needs of the reader are unknown, it is not clear whether these websites provided useful information for serious readers. Second, this study used only general search terms: “hip osteotomy,” “pelvic osteotomy,” and “osteotomy for hip preservation.” While patients may search using more specific terms, such as

“rotational acetabular osteotomy.” Third, while using the search engines, Google and Yahoo used our location and e-mail information,<sup>24)</sup> which may have affected our search results. Fourth, although we developed the OSC score on the basis of previous reports,<sup>12)</sup> its scientific accuracy has not been fully validated. This issue has also been observed in other established, non-orthopedic website evaluation systems. Fifth, websites are constantly being modified and new websites are emerging every day, both of which may have had an impact on the sites analyzed in this study. However, the results of our study suggest that, in Japan, the quality of many internet websites addressing PAO is low and the content is insufficient for visitors to adequately understand PAO.

## PERSPECTIVE

Academic institutions need to positively broadcast medical information for patients because it was difficult to obtain information about PAO from the Japanese Orthopaedic Association through the search engines. There are no references in most websites. When academics and physicians create websites, they need to clarify the reference of the citation about the contents of their website. When a doctor educates patients on how to use of the internet, the doctor should recommend websites that are developed by academics and physicians.

## REFERENCES

- 1) Klaue K, Durnin CW, Ganz R. The acetabular rim syndrome. A clinical presentation of dysplasia of the hip. *J Bone Joint Surg Br*, 1991; 73: 423–429.
- 2) Jacobsen S, Sonne-Holm S. Hip dysplasia: a significant risk factor for the development of hip osteoarthritis. A cross-sectional survey. *Rheumatology (Oxford)*, 2005; 44: 211–218.
- 3) Ganz R, Klaue K, Vinh TS, Mast JW. A new periacetabular osteotomy for the treatment of hip dysplasias: technique and preliminary results. *Clin Orthop Relat Res*, 1988; 232: 26–36.
- 4) Hasegawa Y, Iwase T, Kitamura S, Kawasaki M, Yamaguchi J. Eccentric rotational acetabular osteotomy for acetabular dysplasia and osteoarthritis: follow-up at a mean duration of twenty years. *J Bone Joint Surg Am*, 2014; 96: 1975–1982.
- 5) Yasunaga Y, Ochi M, Yamasaki T, Shoji T, Izumi S. Rotational acetabular osteotomy for pre- and early osteoarthritis secondary to dysplasia provides durable results at 20 years. *Clin Orthop Relat Res*, 2016; 474: 2145–2153.
- 6) Trumble SJ, Mayo KA, Mast JW. The periacetabular osteotomy: minimum 2 year followup in more than 100 hips. *Clin Orthop Relat Res*, 1999; 363: 54–63.
- 7) Biedermann R, Donnan L, Gabriel A, Watcher R, Krismer M, Behensky H. Complications and patient satisfaction after periacetabular pelvic osteotomy. *Int Orthop*, 2008; 32: 611–617.
- 8) Novais EN, Carry PM, Kestel LA, Ketterman B, Brusalis CM, Sankar WN. Does surgeon experience impact the risk of complications after Bernese periacetabular osteotomy? *Clin Orthop Relat Res*, 2017; 475: 1110–1117.
- 9) Ministry of Internal Affairs and Communications; 2015. White paper on information and communication in Japan. Available online: [www.soumu.go.jp/johotsusintokei/whitepaper/ja/h27/html/nc372110.html](http://www.soumu.go.jp/johotsusintokei/whitepaper/ja/h27/html/nc372110.html) (accessed 1 November 2016) (in Japanese).
- 10) Ahmed OH, Sullivan SJ, Schneiders AG, McCrory PR. Concussion information online: evaluation of information quality, content and readability of concussion-related websites. *Br J Sports Med*, 2012; 46: 675–683.
- 11) Starman JS, Gettys FK, Capo JA, Fleischli JE, Norton HJ, Karunakar MA. Quality and content of Internet-based information for ten common orthopaedic sports medicine diagnoses. *J Bone Joint Surg Am*, 2010; 92: 1612–1618.
- 12) Ellsworth B, Patel H, Kamath AF. Assessment of quality and content of online information about hip arthroscopy. *Arthroscopy*, 2016; 32: 2082–2089.
- 13) Lee S, Shin JJ, Haro MS, Song SH, Nho SJ. Evaluating the quality of Internet information for femoroacetabular impingement. *Arthroscopy*, 2014; 30: 1372–1379.

- 14) Saithna A, Ajayi OO, Davis ET. The quality of Internet sites providing information relating to hip resurfacing. *Surgeon*, 2008; 6: 85–87.
- 15) Cassidy JT, Baker JF. Orthopaedic patient information on the World Wide Web: an essential review. *J Bone Joint Surg Am*, 2016; 98: 325–338.
- 16) Ministry of Economy, Trade and Industry; 2010. Establishment of infrastructure in information economy and society in Japan (Research on issues such as competition policy in the platform business on the Internet). Available online: [www.meti.go.jp/policy/it\\_policy/statistics/outlook/h22houkoku.pdf](http://www.meti.go.jp/policy/it_policy/statistics/outlook/h22houkoku.pdf). (2010, accessed 1 November 2016) (in Japanese).
- 17) Sambandam SN, Ramasamy V, Priyanka P, Ilango B. Quality analysis of patient information about knee arthroscopy on the World Wide Web. *Arthroscopy*, 2007; 23: 509–513.
- 18) Boyer C, Selby M, Scherrer JR, Appel RD. The Health On the Net code of conduct for medical and health websites. *Comput Biol Med*, 1998; 28: 603–610.
- 19) Winship B, Grisell M, Yang CB, Chen RX, Bauer AS. The quality of pediatric orthopaedic information on the internet. *J Pediatr Orthop*, 2014; 34: 474–477.
- 20) Charnock D, Shepperd S, Needham G, Gann R. DISCERN: an instrument for judging the quality of written consumer health information on treatment choices. *J Epidemiol Community Health*, 1999; 53: 105–11.
- 21) Khazaal Y, Chatton A, Cochand S, Coquard O, Fernandez S, Khan R, *et al*. Brief DISCERN, six questions for the evaluation of evidence-based content of health-related websites. *Patient Educ Couns*, 2009; 77: 33–37.
- 22) Kanda Y. Investigation of the freely available easy-to-use software ‘EZR’ for medical statistics. *Bone Marrow Transplant*, 2012; 48: 452–458.
- 23) Kwong Y, Kwong FN, Costa ML. The quality of web-based information on hip resurfacing arthroplasty: a cross-sectional survey. *Hip Int*, 2006; 16: 268–272.
- 24) Fast AM, Deibert CM, Hrubby GW, Glassberg KI. Evaluating the quality of Internet health resources in pediatric urology. *J Pediatr Urol*, 2013; 9: 151–156.