

# ChatGPT and Google Provide Mostly Excellent or Satisfactory Responses to the Most Frequently Asked Patient Questions Related to Rotator Cuff Repair



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**Purpose:** To assess the differences in frequently asked questions (FAQs) and responses related to rotator cuff surgery between Google and ChatGPT. **Methods:** Both Google and ChatGPT (version 3.5) were queried for the top 10 FAQs using the search term “rotator cuff repair.” Questions were categorized according to Rothwell’s classification. In addition to questions and answers for each website, the source that the answer was pulled from was noted and assigned a category (academic, medical practice, etc). Responses were also graded as “excellent response not requiring clarification” (1), “satisfactory requiring minimal clarification” (2), “satisfactory requiring moderate clarification” (3), or “unsatisfactory requiring substantial clarification” (4). **Results:** Overall, 30% of questions were similar between what Google and ChatGPT deemed to be the most FAQs. For questions from Google web search, most answers came from medical practices (40%). For ChatGPT, most answers were provided by academic sources (90%). For numerical questions, ChatGPT and Google provided similar responses for 30% of questions. For most of the questions, both Google and ChatGPT responses were either “excellent” or “satisfactory requiring minimal clarification.” Google had 1 response rated as satisfactory requiring moderate clarification, whereas ChatGPT had 2 responses rated as unsatisfactory. **Conclusions:** Both Google and ChatGPT offer mostly excellent or satisfactory responses to the most FAQs regarding rotator cuff repair. However, ChatGPT may provide inaccurate or even fabricated answers and associated citations. **Clinical Relevance:** In general, the quality of online medical content is low. As artificial intelligence develops and becomes more widely used, it is important to assess the quality of the information patients are receiving from this technology.

Machine learning (ML) has emerged as a transformative technology with the potential to revolutionize various aspects of health care. One of the most widely used ML tools is ChatGPT, which was created by OpenAI (San Francisco, CA). ChatGPT is a large language model that uses public information from up until September 2021 to engage with users in a conversational format.<sup>1</sup> With a large breadth of data from which to draw, ChatGPT and other ML tools have

a wide variety of uses that are being actively explored. ML may help increase efficiency and cost-effective care by automating repetitive tasks and streamlining health care management.<sup>2</sup> This technology opens up new avenues for optimizing health care processes and improving patient outcomes.

One particular area in which ML can make a significant difference is enhancing patient access to accurate and reliable health information. Currently, many Americans turn to search engines such as Google to seek answers to their medical questions. However, the vast array of search results, ranging from government websites to personal blogs, varies in the accuracy and reliability of the information presented.<sup>3-5</sup> Sixty-five percent of patients considering elective orthopaedic procedures use the internet to learn about a procedure of interest without vetting the accuracy and readability of the information.<sup>6,7</sup> This presents an opportunity to explore how ML algorithms, such as ChatGPT, compare with traditional search engines in delivering valuable and accurate information to patients seeking

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information on elective orthopaedic procedures. Previous studies have investigated the utility of ChatGPT in the field of orthopaedics.<sup>8-10</sup> Dubin et al.<sup>11</sup> examined ML and Google searches in addressing frequently asked questions (FAQs) in total joint arthroplasty. Although the results showed promise, more comprehensive research is needed before ChatGPT can be established as a reliable and accurate tool for patients. The purpose of this study was to assess the differences in FAQs and responses related to rotator cuff surgery between Google and ChatGPT. We hypothesized that the most FAQs would be similar between Google and ChatGPT and that both would provide mostly satisfactory answers to these questions.

## Methods

Methods were adapted from a previous study by Dubin et al.<sup>11</sup> After clearing browser history, cookies, and cache, a Google web search (Google, Menlo Park, CA) was conducted in July 2023 using a Google Chrome browser (Version 113.0.5672.126). This avoids potential individualized search algorithms to best replicate a “generic” search. The search term used was “rotator cuff repair.” Inclusion criteria included any question that contained the terms “rotator cuff repair,” “rotator cuff surgery,” or “rotator cuff.” Exclusion criteria included questions that did not include these terms or were not relevant to rotator cuff surgery. A secondary search was conducted using the search term “rotator cuff surgery” to evaluate whether the results differed. However, both searches were largely similar, and we decided to use the results from the search term “rotator cuff repair.” The search term was entered in Google and the top 10 most FAQs were obtained from the “People Also Ask” that automatically populates on the Google web page. For each question, the source that provided the answer was noted and categorized as either commercial, academic, medical practice, single-surgeon practice, government, or social media on the basis of Rothwell’s classification ([Appendix Table 1](#), available at [www.arthroscopyjournal.org](http://www.arthroscopyjournal.org)). In addition, each question was assigned a category of fact, value, or policy on the basis of Rothwell’s classification as well as a subcategory ([Appendix Table 1](#)).<sup>12,13</sup> Institutional review board approval was not required for this study, as only publicly available data were used and no patient information obtained.

After results for the top 10 FAQs from Google were obtained, a similar search was conducted using ChatGPT, version 3.5 (OpenAI). We input the following prompt into ChatGPT to assess its utility in providing the same information that was obtained in a Google query: “Perform a search with the search term ‘rotator cuff repair’ and record the 10 most popular questions related to the search term.” Again, the top 10 questions were recorded and categorized. Because ChatGPT did

**Table 1.** Top 10 Most FAQs for Rotator Cuff Repair From Google and ChatGPT Queries

Top 10 questions from Google
<b>How long does it take to recover from a rotator cuff repair surgery? (fact—timeline of recovery)</b>
<b>What are the 3 types of rotator cuff repair? (fact—technical details)</b>
Why is rotator cuff repair so painful? (value—pain)
How painful is rotator cuff surgery and recovery? (value—pain)
What are the worst things to do after rotator cuff surgery? (fact—restrictions)
How long after rotator cuff surgery can you sleep in a bed? (fact—specific activities)
<b>Is rotator cuff surgery worth having? (policy—indications/management)</b>
How long do you wear a sling after rotator cuff surgery? (fact—timeline of recovery)
What is the fastest way to recover from rotator cuff surgery? (fact—timeline of recovery)
Can I drive 2 weeks after rotator cuff surgery? (fact—specific activity)
Top 10 questions from ChatGPT
<b>What is the recovery time after rotator cuff repair surgery? (fact—timeline of recovery)</b>
<b>How is rotator cuff repair performed? (fact—technical details)</b>
What are the symptoms of a torn rotator cuff? (policy—indications/management)
What is a rotator cuff repair? (fact- technical details)
Are there any non-surgical treatments for a torn rotator cuff? (policy—indications/management)
What are the potential risks and complications of rotator cuff repair? (policy—risk/complications)
How long does it take to regain full shoulder strength after surgery? (fact—timeline of recovery)
<b>What are the success rates of rotator cuff repair surgery? (value—evaluation of surgery)</b>
Can a torn rotator cuff heal without surgery? (policy—indications/management)
Can physical therapy help after rotator cuff repair surgery? (policy—indications/management)

Similar questions between Google and ChatGPT are shown in bold.

not immediately provide a source for each question, each question was individually inputted along with the prompt “include source.” The source for each question was then recorded and categorized. These sources were assessed for accuracy by searching for the citations in both Google and PubMed, which allowed us to determine whether these sources existed and whether the information that ChatGPT had claimed was obtained from these citations.

After all responses were obtained, 2 authors (M.M. and A.K.H.) independently graded the responses using the scoring system developed by Mika et al.<sup>14</sup> Responses were assigned a number (i.e., “response accuracy score”) corresponding to the adequacy of the response and amount of clarification needed. The responses were rated as “excellent response not requiring clarification” (1), “satisfactory requiring minimal clarification” (2), “satisfactory requiring moderate clarification” (3), or “unsatisfactory requiring substantial

clarification" (4).<sup>14</sup> Any disagreements regarding the score were settled through a discussion by the 2 authors to determine the final score assigned to each response. Cohen's kappa was calculated as 0.757 (95% confidence interval 0.510-1) on the basis of the original blinded scoring by each author, indicating substantial agreement.<sup>15</sup> The same search term was then used to perform a Google search to obtain the top 10 numerical questions related to rotator cuff repair. The answers were noted along with the source for each answer. These questions were then input into ChatGPT, and the answers and sources provided by ChatGPT were recorded. The top 10 FAQs for ChatGPT and Google are available in [Table 1](#). This was done to assess whether Google and ChatGPT would provide similar information to objective questions that patients may ask related to rotator cuff repair surgery.

### Statistical Methods

All data were collected and tabulated using Microsoft Excel (Microsoft Corporation, Redmond, WA). Descriptive statistics including counts and percentages were calculated as appropriate.

### Results

The top 10 FAQs for ChatGPT and Google are available in [Table 1](#). Overall, 30% of questions were similar between what Google and ChatGPT deemed to be the most FAQs. The most common question topic for Google was Fact (70%), whereas the most common topic for ChatGPT was Policy (50%). The most common subcategory of question for Google was Timeline of Recovery (30%), whereas the most common subcategory for ChatGPT was Indication/Management (40%). The most common source cited for answers on Google was medical practice (40%), whereas for ChatGPT it was academic (90%). Of the 3 questions that were similar between Google and ChatGPT, only one provided an answer from the same source category.

The top questions from Google were input into ChatGPT to compare answers between the 2 search tools ([Table 2](#)).<sup>16-26</sup> Responses to each question from Google and ChatGPT were graded and compared as well ([Appendix Table 1](#)). For most questions, both Google and ChatGPT responses were either "excellent" or "satisfactory requiring minimal clarification" ([Fig 1](#)). Google had 1 response rated as satisfactory requiring moderate clarification, whereas ChatGPT had 2 responses rated as unsatisfactory. There were no questions for which ChatGPT offered markedly different or conflicting responses when compared with Google. Cohen's kappa was calculated as 0.757 (95% confidence interval 0.510-1) on the basis of the original blinded scoring by each author, indicating substantial agreement.<sup>15</sup>

For numerical questions, ChatGPT and Google provided similar responses for only 30% questions

([Table 3](#)). Notably, Google provided more specific numerical responses, whereas ChatGPT provided less precise responses (e.g., "after the first few days or weeks"). The most-cited source categories for Google were academic (30%) and government (30%) whereas for ChatGPT, most answers referenced academic (70%) sources ([Table 3](#)). Of note, 2 of the sources cited for answers on ChatGPT were fabricated references that did not link to an existing study or article.

### Discussion

Google and ChatGPT provided comparable responses to FAQs; however, ChatGPT had less transparency and integrity in the sources of the information provided. Currently, Google remains the most used search engine in the United States. However, innovative ML tools are becoming increasingly popular among medical professionals and patients, with a recent study reporting a 10-fold increase in publications related to ML in orthopaedics over the last 2 decades, which is expected to continually increase.<sup>27-29</sup> Both traditional search engine queries and ML algorithms will continue to play important roles as a source of information for patients. Previous literature has shown that many patients report improved relationships with their physicians after discussing health information obtained from online searches before consultation.<sup>5,30,31</sup> Furthermore, the process of obtaining informed consent for elective orthopaedic surgery may be improved after the use of patient education with online educational material.<sup>6</sup> The primary objective of this study was to better understand a patient's experience obtaining information via an internet search regarding rotator cuff repair. In addition, we analyzed and compared the FAQs, answers, and sources provided by Google and ChatGPT to determine similarities and differences between these 2 platforms.

In our study, we found that only 30% of FAQs were similar between these 2 resources. This is similar to a previous study that compared Google and ChatGPT for total joint arthroplasty and found that only 25% of the FAQs were similar between the 2 search engines.<sup>11</sup> When Rothwell's classification for analysis was used, the top 10 FAQs provided from Google mainly referenced fact and timeline of recovery, whereas ChatGPT displayed responses related to policy and rotator cuff surgical indications and management. These findings are in line with a previous study in which the authors analyzed online FAQs via a search engine for rotator cuff repair and found that fact was the most common overall category, whereas timeline for recovery, indications/management, and pain were the most common subcategories.<sup>32</sup> One potential explanation for this discrepancy in FAQs is that Google search is dynamic and changes resulting from various trends and updates whereas ChatGPT is more limited in the currency of

**Table 2.** Comparison of Answers for the Top 10 Most Popular Questions Between Google and ChatGPT

Question	Google Answer	Grade	ChatGPT Answer	Grade	Evidence-Based Response
How long does it take to recover from a rotator cuff repair surgery?	It takes the repaired rotator cuff tendons about 6 weeks to heal initially to the bone, 3 months to form a relatively strong attachment to the bone, and about 6 to 9 months before the tendon is completely healed to the bone. <b>(academic)</b>	1	Generally, it takes several months to achieve a full recovery and return to normal activities. First 6 weeks: During this period, physical therapy will begin to regain some range of motion in the shoulder while still protecting the repair. 6 weeks to 3 months: Physical therapy intensifies to work on restoring strength, flexibility, and function. 3-6 months: At this stage, patients can gradually return to more normal activities, but they may still need to avoid heavy lifting or strenuous overhead movements. 6 months and beyond: It can take up to 6 months or longer for some patients to achieve a full recovery. <b>(academic)</b>	1	On average, patients experience 75% of pain relief and 50% of functional recovery by 3 months postoperatively with larger tears having a slower speed of recovery. By 6 months, patients should experience a near full recovery. <sup>16</sup>
What are the 3 types of rotator cuff repair?	The 3 techniques most commonly used for rotator cuff repair are: • Traditional open repair. • Arthroscopic repair. • Mini-open repair <b>(academic)</b>	1	As of my last update in September 2021, the 3 main types of rotator cuff repair are: • Open repair • Arthroscopic repair • Mini-open repair <b>(government)</b>	1	The 3 main modalities of rotator cuff repair are arthroscopic, open, and mini-open. <sup>17,18</sup>
Why is rotator cuff repair so painful?	A rotator cuff surgery is a major surgical intervention in the shoulder, and the reason that there is pain after surgery is the amount of normal surgical trauma. Cutting, drilling, cauterizing, and suturing tissues create pain and inflammation. <b>(medical practice)</b>	2	• Inflammation and tissue damage • Surgical trauma • Nerve irritation • Rehabilitation and physical therapy • Individual variations • Postoperative swelling <b>(academic)</b>	2	Recovery from rotator cuff repair can be painful as the result of significant soft-tissue mobilization during the procedure. <sup>19</sup>
How painful is rotator cuff surgery and recovery?	Patients who are recovering from rotator cuff surgery know all too well that surgery on the shoulder is often painful. Some patients have very little pain after shoulder surgery, but most have significant pain for a few days to a few weeks. <b>(single-surgeon practice)</b>	3	The pain experienced during rotator cuff surgery and the recovery period can vary from person to person, as it depends on factors such as the individual's pain tolerance, the extent of the surgery, and the success of postoperative pain management. Generally, rotator cuff surgery is considered a moderately painful procedure, and the recovery process can be challenging, particularly during the initial phase. In the immediate postoperative period, patients may experience significant pain and discomfort, especially for the first few days after surgery. The pain is often managed with prescribed medications and a combination of ice packs and elevation to reduce swelling. Over time, the pain typically subsides as the body heals, and the patient may transition to milder pain relief measures. <b>(academic)</b>	1	RCR can be associated with severe postoperative pain and discomfort that requires adequate analgesia. <sup>20</sup>

(continued)

**Table 2.** Continued

Question	Google Answer	Grade	ChatGPT Answer	Grade	Evidence-Based Response
What are the worst things to do after rotator cuff surgery?	<p>DON'T:</p> <ul style="list-style-type: none"> <li>• put weight through your arm or lift anything for 6 weeks.</li> <li>• try to reach above or behind you.</li> <li>• lie on the operated side for a minimum of 6 weeks.</li> <li>• Do not get your bandage wet.</li> <li>• take anti-inflammatory medications such as naproxen for the first 12 weeks.</li> <li>• soldier on. <b>(medical practice)</b></li> </ul>	1	<p>After rotator cuff surgery, it's crucial to follow your surgeon's postoperative instructions carefully to promote proper healing and avoid complications. Here are some of the worst things to do after rotator cuff surgery:</p> <ul style="list-style-type: none"> <li>• Ignoring rehabilitation</li> <li>• Overexertion and lifting heavy objects</li> <li>• Ignoring pain or new symptoms</li> <li>• Not wearing sling or immobilizer</li> <li>• Engaging in sports or physical activities too soon</li> <li>• Sleeping on the operated shoulder</li> <li>• Smoking</li> </ul> <p>Not following medication instructions <b>(academic)</b></p>	1	Heavy lifting and unnecessary movements should be avoided in the immediate postoperative period. Patients with physically demanding jobs should take extra caution when returning to work to prevent risk of reinjury. <sup>21</sup>
How long after rotator cuff surgery can you sleep in a bed?	<p>You will most likely need to sleep in a semi-reclined position for at least 6 weeks after surgery, sometimes longer. If you don't own a recliner, it may be worthwhile to buy one or borrow one from a friend before you have your shoulder surgery. <b>(medical practice)</b></p>	2	<p>Patients may be advised to avoid sleeping on the operated shoulder for a certain period to allow for proper healing. The specific timeframe can vary depending on the surgeon's recommendations, the type of surgery performed, and individual factors. <b>(no source provided)</b></p>	4	Patients should avoid sleeping on the operated shoulder for several weeks after surgery. Patients may experience sleep disturbances, which should begin to improve by 3 months postoperatively. <sup>22</sup>
Is rotator cuff surgery worth having?	<p>Surgery may be a good choice for you if both of the following are true: Shoulder pain or weakness limits your ability to do your daily activities, to be active, and to sleep well. These symptoms have not improved after a period of non-surgical treatment, including a well-designed physical rehabilitation program. <b>(government)</b></p>	2	<p>The decision to undergo rotator cuff surgery depends on several factors, including the severity of the injury, the individual's overall health, their level of pain and disability, and the effectiveness of nonsurgical treatments.</p> <p>Rotator cuff surgery is often considered when other conservative treatments, such as physical therapy and medication, have failed to provide relief. The surgery aims to repair the torn or damaged tendons in the shoulder to improve function and reduce pain. <b>(academic)</b></p>	2	RCR should only be considered after failing to improve with conservative management, which tends to have good success. <sup>23</sup>

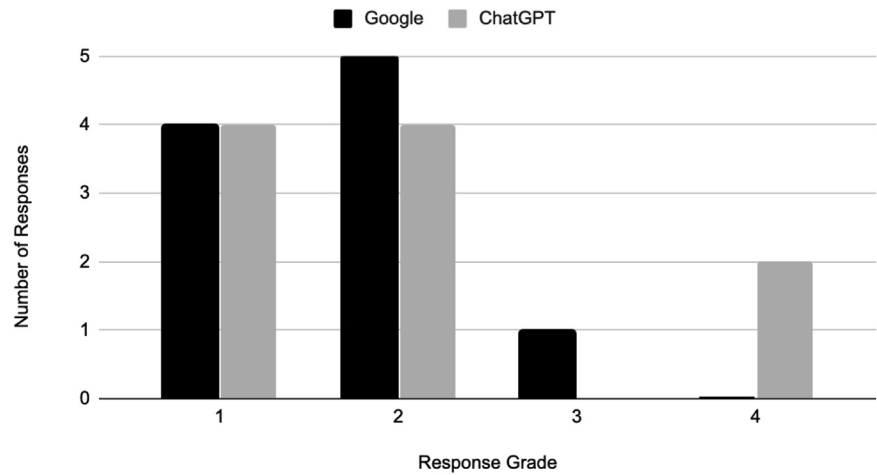
(continued)

Table 2. Continued

Question	Google Answer	Grade	ChatGPT Answer	Grade	Evidence-Based Response
How long do you wear a sling after rotator cuff surgery?	Patients are often advised to wear a sling or brace for the first 4-6 weeks after RCR surgery to prevent them from performing any physical activities involving the affected shoulder. <b>(government)</b>	1	The duration for wearing a sling after rotator cuff surgery can vary depending on the individual patient's recovery progress and the surgeon's recommendations. Typically, patients may need to wear a sling for a few weeks after surgery to protect the healing tissues and promote proper shoulder positioning. However, it's important to note that specific guidelines and recommendations can only be provided by the surgeon who performs the procedure, as they can tailor the recovery plan on the basis of the patient's condition and the specific surgical technique used. <b>(no source provided)</b>	2	Although most clinicians recommend wearing a sling for 4-6 weeks postoperatively, some studies have shown improved early range of motion when no sling is used in the postoperative period. <sup>24</sup>
What is the fastest way to recover from rotator cuff surgery?	Eight tips to speed recovery after rotator cuff surgery: <ul style="list-style-type: none"> <li>• Wear a sling. To speed recovery, it is important to keep your shoulder immobilized initially after surgery so your tendon can heal.</li> <li>• Sleep carefully.</li> <li>• Ask for help.</li> <li>• Watch for complications.</li> <li>• Do the physical therapy.</li> <li>• Keep comfortable.</li> <li>• Be mindful of your movement.</li> <li>• Pace yourself. <b>(medical practice)</b></li> </ul>	2	Recovering from rotator cuff surgery requires a combination of following the surgeon's post-operative instructions, undergoing physical therapy, and allowing ample time for healing. Although there is no magic "fastest" way to recover, there are steps you can take to optimize your recovery process. Here are some general tips: <ul style="list-style-type: none"> <li>• Adhere to postoperative instructions</li> <li>• Physical therapy</li> <li>• RICE therapy</li> <li>• Pain management</li> <li>• Gradual return to activity</li> <li>• Nutrition and hydration</li> <li>• Quit smoking</li> <li>• Rest and sleep <b>(academic)</b></li> </ul>	2	Avoid aggressive early rehabilitation after RCR as full tendon to bone healing typically takes 12 weeks. <sup>25</sup>
Can I drive 2 weeks after rotator cuff surgery?	It's important to note that during rotator cuff surgery recovery, you will likely be in a sling from 2 to 6 weeks. Until you're out of your sling, it is not recommended to drive. <b>(single-surgeon practice)</b>	2	Driving after rotator cuff surgery can depend on various factors, including the type of surgery performed, the extent of the injury, your individual recovery progress, and your surgeon's recommendations. In general, driving after rotator cuff surgery may not be advisable during the early stages of recovery because of the risk of reinjury and impaired control of the vehicle. The use of pain medications and limitations in range of motion could also affect your ability to drive safely. <b>(no source provided)</b>	4	Patients should be able to drive 2 weeks after RCR as long as pain and range of motion are not limiting activity. <sup>26</sup>

RCR, rotator cuff repair.

**Fig 1.** Grading of Google and ChatGPT responses to the most frequently asked questions regarding rotator cuff repair. Grading footnotes: (1) “excellent response not requiring clarification,” (2) “satisfactory requiring minimal clarification,” (3) “satisfactory requiring moderate clarification,” and (4) “unsatisfactory requiring substantial clarification.”



information it can provide. In fact, ChatGPT provided the following disclaimer: “Please note that the actual popular questions related to the search term may vary based on the current trends and developments.”

The sources referenced by Google and ChatGPT in answering the FAQs also showed considerable differences. Interestingly, individual medical practices were the main sources referenced by Google, whereas ChatGPT provided academic references to answer the most FAQs. Of note, 2 sources provided by ChatGPT appeared to be fabricated, as they were unable to be located via PubMed search. This is troublesome and raises questions about the integrity of the information provided by ChatGPT. The answers and information provided from these search engines demonstrated that

only one answer for similar questions was provided by the same source category, suggesting a potential issue of sourcing of information acquired by patients. Nevertheless, when questions from Google were input into ChatGPT, the answers provided by ChatGPT were consistent with the more definitive answers received from Google and were never conflicting. Of note, ChatGPT had to be specifically prompted to provide the references that were used to generate responses, whereas Google linked to these references by default. In addition, most of the responses to these questions received a grade of “excellent” or “satisfactory requiring minimal clarification” and were largely in agreement with evidence found in the literature (Appendix Table 1). These findings are in line with other studies

**Table 3.** Comparison of Numerical Questions for Rotator Cuff Surgery

Question	Google	ChatGPT
How long does it take to recover from a rotator cuff repair surgery?	6-9 months ( <b>academic</b> )	4-6 months ( <b>academic</b> )
How long after rotator cuff surgery can you sleep in a bed?	6 weeks ( <b>medical practice</b> )	After the first few days or weeks ( <b>academic</b> )
How long do you wear a sling after rotator cuff surgery?	4-6 weeks ( <b>government</b> )	A few days to several weeks ( <b>academic</b> )
<b>Can I drive 2 weeks after rotator cuff surgery?</b>	2-6 weeks ( <b>single-surgeon practice</b> )	Avoid for the first few weeks ( <b>academic</b> )
<b>What is the success rate of rotator cuff surgery?</b>	90% ( <b>government</b> )	75%-95% ( <b>government</b> )*
Can you lift again after rotator cuff surgery?	4-6 months ( <b>single-surgeon practice</b> )	Several weeks to a few months ( <b>academic</b> )
How big is the incision for rotator cuff surgery?	2-3 inches (5-7.5 cm) ( <b>government</b> )	<1 cm each ( <b>academic</b> )
How soon can I wear a bra after shoulder surgery?	2 weeks ( <b>medical practice</b> )	“Follow the instructions and recommendations provided by your surgeon for your specific case” ( <b>medical practice</b> )
<b>When is pain the worst after rotator cuff surgery?</b>	During the first days ( <b>academic</b> )	First few days ( <b>academic</b> )
What percentage of rotator cuff tears require surgery?	When more than 90% of the tendon is torn ( <b>academic</b> )	40%-50% of tears require surgery ( <b>government</b> )*

Items in bold indicate similar responses.  
\*Indicates a fabricated source provided.

that have found that ChatGPT responses to common patient questions regarding anterior cruciate ligament reconstruction and total hip arthroplasty were mostly excellent or satisfactory requiring minimal to moderate clarifications.<sup>14,28</sup>

In contrast, only 30% of the responses to quantitative questions received from Google and ChatGPT were found to be similar. In addition, we found that ChatGPT provided less-precise responses to certain quantitative questions. For example, in response to “How long do you wear a sling after rotator cuff surgery?” Google’s answer was “4-6 weeks,” whereas ChatGPT’s response was “a few days to several weeks.” This disparity in terms of accuracy of answers is important to note because it may influence patient decision making in terms of whether to have rotator cuff surgery as well as the timing of surgery. Of the sources cited from Google for quantitative questions, 30% were academic and 30% were from government references. However, ChatGPT provided 70% of its answers from academic sources. These are all valid sources from which to reference, but it is important to ensure that the sources are vetted appropriately and that the information being provided by Google and ChatGPT is accurate and verifiable.

The most concerning finding is that ChatGPT provided fabricated references for 2 of the questions. These fabricated references were displayed as links identical to legitimate references that routed users to incorrect or nonexistent sources of information. Conversely, Google never provided false or fabricated references. A previous study in which the authors analyzed ChatGPT in spine surgery found that it had a tendency to make conclusive statements when describing topics for which no such conclusive evidence exists.<sup>33</sup> In addition, Shrestha et al.<sup>34</sup> found that when providing clinical guideline recommendations for low back pain, ChatGPT tended to wrongly suggest evidence and often failed to mention when there is not enough evidence to adequately give an accurate recommendation. Thus, both physicians and patients should be cautious that ChatGPT has been known to experience “hallucinations,” in which it presents falsified references and information that may be incorrect and should ensure to vet these sources appropriately.<sup>35</sup> Orthopaedic surgeons may be able to navigate these issues, but fabrication of references and information remains of great concern for patients relying on ChatGPT as a reputable source for answers. Despite its limitations, ChatGPT has been shown to provide evidence-based responses that are easy to understand in other areas of orthopaedics such as total hip arthroplasty and spine surgery.<sup>14,33</sup>

As noted previously, ChatGPT can only access public information up until September 2021, while the Google search was performed in June 2023, which may account for some of the differences in questions. In

addition, ChatGPT is highly sensitive to prompting and using different prompts or word choice may result in different questions or answers being provided.<sup>36</sup> This is yet another potential area for future research as there may be ways to develop standardized prompts for patients and/or physicians to use when attempting to obtain information on ChatGPT related to rotator cuff repair. ChatGPT may eventually prove to be a valuable resource for physicians and patients alike, but further research and vetting are necessary before its widespread use should be encouraged.

### Limitations

This study is subject to several limitations. Generalizability may be limited, as the search was conducted at a single point in time, and results may change on the basis of different times, trends, and individual factors such as age, sex, level of education, and income, which have been shown to influence search results.<sup>37,38</sup> Moreover, our study does not take into account that specific rotator cuff repair protocols vary on the basis of surgeon preference and expertise.

### Conclusions

Both Google and ChatGPT offer mostly excellent or satisfactory responses to the most FAQs regarding rotator cuff repair. However, ChatGPT may provide inaccurate or even fabricated answers and associated citations.

### Disclosures

The authors that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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