




Aesthetic Surgery Advice and Counseling from Artificial Intelligence: A Rhinoplasty Consultation with ChatGPT

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Abstract

Background ChatGPT is an open-source artificial large language model that uses deep learning to produce human-like text dialogue. This observational study evaluated the ability of ChatGPT to provide informative and accurate responses to a set of hypothetical questions designed to simulate an initial consultation about rhinoplasty.

Methods Nine questions were prompted to ChatGPT on rhinoplasty. The questions were sourced from a checklist published by the American Society of Plastic Surgeons, and the responses were assessed for accessibility, informativeness, and accuracy by Specialist Plastic Surgeons with extensive experience in rhinoplasty.

Results ChatGPT was able to provide coherent and easily comprehensible answers to the questions posed, demonstrating its understanding of natural language in a health-specific context. The responses emphasized the importance of an individualized approach, particularly in aesthetic plastic surgery. However, the study also highlighted ChatGPT's limitations in providing more detailed or personalized advice.

Conclusion Overall, the results suggest that ChatGPT has the potential to provide valuable information to patients in a medical context, particularly in situations where patients may be hesitant to seek advice from medical professionals or where access to medical advice is limited. However, further research is needed to determine the scope and

limitations of AI language models in this domain and to assess the potential benefits and risks associated with their use.

Level of Evidence V Observational study under respected authorities. This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors www.springer.com/00266.

Keywords ChatGPT · Artificial intelligence · Chatbot · Rhinoplasty

Introduction

The human nose is a significant facial feature that plays a crucial role in facial aesthetics and identity. [1, 2] Rhinoplasty is a complex surgical procedure with historical significance. It is aimed at improving both the functional and aesthetic aspects of the nose following trauma or disease-related deformities. [3] The objective of aesthetic rhinoplasty is to create a natural-looking nose that integrates well with the rest of the face, with no visible signs of surgical intervention, and that allows the patient to breathe freely. [4] Being one of the most sought after surgeries globally, patients often have numerous questions regarding the procedure, which they may feel too self-conscious to ask or may not even be aware they need to inquire about.

Artificial intelligence (AI) language-generated tools present a promising avenue to revolutionize the delivery of scientific information. One such tool is ChatGPT, a large language model capable of generating human-like text which has attracted significant attention for its potential to assist researchers in writing scientific papers and

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performing literature reviews. Trained on massive amounts of text data from a wide variety of sources on the internet, ChatGPT is capable of providing logical, comprehensible and accurate responses to almost any question, including those of a medical nature.

Despite the rapid expansion of AI, there is still limited understanding of its potential value for public inquiry. To address this gap, the authors conducted a hypothetical rhinoplasty consultation, using ChatGPT to generate answers to questions commonly asked by patients, and evaluating its responses. The authors propose that the integration of AI and language models, such as ChatGPT, in medical consultation holds significant promise for improving patient education and satisfaction. As AI and machine learning continue to advance, they may enable novel approaches to enhancing patient outcomes.

Methods

Aim

In this study, we aimed to investigate the potential of artificial intelligence language models to serve as clinical assistants. For this purpose, we employed ChatGPT, one of the largest language models currently accessible to the public, and evaluated its capacity, effectiveness, and accuracy in providing perioperative information to a patient.

Study Design

We asked ChatGPT nine hypothetical questions simulating a doctor-patient consultation for rhinoplasty surgery. The questions were based on a comprehensive rhinoplasty consultation checklist published on the American Society of Plastic Surgeons website [5]. The scenario objective was to cover a broad cross section of information that a prospective patient might want to know. The responses

provided by ChatGPT were assessed for accuracy, informativeness, and accessibility by Specialist Plastic Surgeons (DHS, WR, RR and ML) with extensive experience in rhinoplasty. By rigorously evaluating these responses according to the criteria, we sought to establish the utility of AI-generated language models in simulating doctor-patient consultations.

Inclusion Criteria

ChatGPT has a probabilistic algorithm and uses random sampling to generate varied responses, which can result in different answers to the same question. For this study, the first response provided by ChatGPT to each question was recorded, and subsequent clarifications or corrections were not allowed. Care was taken to ensure there were no grammatical or syntax errors in each question, and the questions were typed on the same day on a single ChatGPT Plus account owned by one of the authors. ChatGPT Plus is a subscription-only model of ChatGPT which purports to offer faster response times, priority access to new features, and access to the AI server even during periods of high demand. There is no publicly available information to determine if ChatGPT Plus utilizes a different algorithm to the standard model to generate responses.

Results

To begin the consult, ChatGPT was asked “I’m thinking of getting a rhinoplasty, am I a good candidate for this procedure?” (Figure 1). This was followed up with “How might the surgeon perform my procedure?” (Figure 2).

ChatGPT prefaced its response to the first question with a disclaimer that it cannot make individual medical assessments or provide medical advice. It noted several general points that a patient should consider before undergoing a rhinoplasty: being in good overall health, having a fully developed nasal bone structure, and having

Fig. 1 Prompt “I’m thinking of getting a rhinoplasty, am I a good candidate for this procedure?”

PH I'm thinking of getting a rhinoplasty, am I a good candidate for this procedure?



As an AI language model, I cannot make individual medical assessments or provide medical advice. However, generally, a good candidate for rhinoplasty is someone who is in good overall health, has a fully developed nasal bone structure, and has realistic expectations about the outcome of the surgery. It is important to have a consultation with a qualified plastic surgeon to discuss your specific case and determine if rhinoplasty is right for you. The surgeon will consider factors such as the shape of your nose, your facial features, and your overall health to determine if you are a good candidate for the procedure.

Fig. 2 Prompt “How might the surgeon perform my procedure?”

PH How might the surgeon perform my procedure?



The specific details of how a rhinoplasty procedure is performed will depend on your individual case and your surgeon's preferences. However, in general, there are two techniques that may be used for rhinoplasty: open rhinoplasty and closed rhinoplasty.

Open rhinoplasty involves making a small incision on the outside of the nose, along the strip of tissue that separates the nostrils (called the columella), and then lifting the skin to access the underlying nasal structures. This technique provides the surgeon with a more direct view of the nasal structures and may be preferred for more complex procedures.

Closed rhinoplasty involves making incisions inside the nostrils, so that all of the surgical work is performed through these incisions. This technique may be preferred for less complex procedures and may result in less visible scarring.

Your surgeon will evaluate your individual case and discuss with you which technique they recommend for your rhinoplasty procedure. They will also discuss the specifics of the surgery, including how long it will take, what type of anesthesia will be used, and what you can expect during and after the surgery.

Fig. 3 Prompt “What are the steps involved in an open rhinoplasty? Please be specific”

PH What are the steps involved in an open rhinoplasty? Please be specific



In an open rhinoplasty, the following steps are typically involved:

1. Anesthesia: The patient is given general anesthesia, which ensures that they are comfortable and asleep during the procedure.
2. Incision: A small incision is made on the outside of the nose, along the strip of tissue that separates the nostrils (called the columella).
3. Dissection: The skin is lifted away from the underlying nasal structures, providing the surgeon with a clear view of the nasal anatomy.
4. Reshaping the nasal structures: Using various surgical techniques, the surgeon reshapes the nasal structures to achieve the desired result. This may involve removing or adding tissue, reshaping the cartilage or bone, or adjusting the position of the nasal septum.
5. Closing the incision: Once the necessary adjustments have been made, the skin is re-draped over the underlying structures, and the incision is closed with sutures.
6. Application of a splint: A splint or cast is applied to the nose to help it maintain its new shape and protect it during the initial healing period.

After the procedure, the patient will be monitored in a recovery area until they are alert and comfortable. They may experience swelling, bruising, and discomfort for several days to several weeks following the surgery, and they will need to follow their surgeon's post-operative instructions carefully to ensure proper healing. The surgeon will provide the patient with specific instructions on caring for their nose during the recovery period and when to follow up for a post-operative visit.

Fig. 4 Prompt “What are the steps in a closed rhinoplasty? Please be specific”



What are the steps in a closed rhinoplasty? Please be specific



In a closed rhinoplasty, the following steps are typically involved:

1. Anesthesia: The patient is given general anesthesia, which ensures that they are comfortable and asleep during the procedure.
2. Incisions: Incisions are made inside the nostrils, and the surgeon accesses the nasal structures through these incisions.
3. Dissection: The skin is lifted away from the underlying nasal structures, providing the surgeon with a clear view of the nasal anatomy.
4. Reshaping the nasal structures: Using various surgical techniques, the surgeon reshapes the nasal structures to achieve the desired result. This may involve removing or adding tissue, reshaping the cartilage or bone, or adjusting the position of the nasal septum.
5. Closing the incisions: Once the necessary adjustments have been made, the incisions inside the nostrils are closed with sutures.
6. Application of a splint: A splint or cast is applied to the nose to help it maintain its new shape and protect it during the initial healing period.

After the procedure, the patient will be monitored in a recovery area until they are alert and comfortable. They may experience swelling, bruising, and discomfort for several days to several weeks following the surgery, and they will need to follow their surgeon's post-operative instructions carefully to ensure proper healing. The surgeon will provide the patient with specific instructions on caring for their nose during the recovery period and when to follow up for a post-operative visit.

realistic expectations about the outcome. Other relevant and important points such as patient objectives, cultural differences, and the cessation of smoking were not raised. ChatGPT outlined the two main approaches to rhinoplasty: open and closed, with only a perfunctory description of each.

ChatGPT was invited to elaborate on its response with three further prompts “What are the steps in a closed rhinoplasty? Please be specific” (Fig. 3), followed by “What are the steps in an open rhinoplasty? Please be specific” (Fig. 4). Thirdly, ChatGPT was prompted “Under what circumstances would you perform one or the other?” (Fig. 5).

Except for the incisional approach, ChatGPT gave the same response to both questions. Although the incision is an important distinction, ChatGPT failed to grasp the other technical differences between the two procedures. Its description of the dissection, for example, stated that “the skin is lifted away from the underlying nasal structures, providing the surgeon with a clear view of the nasal anatomy.” This generic statement inadequately portrays some of the challenges associated with the endonasal approach, such as the relatively limited surgical view, or

the difficulties in the dissection of the alar cartilages, particularly if they are mispositioned. It also did not distinguish the difference in postoperative care for both procedures, which varies due to the often-decreased operative time and faster recovery for closed rhinoplasties. ChatGPT provided an adequate summary of when one might be preferable to the other, such as an open rhinoplasty for more precise correction of complex deformities, and a closed approach if the aim is to make conservative modifications and avoid external scarring [6]. Again, a disclaimer is provided, advising that the decision should be made with the surgeon on an individual basis.

Following the procedural questions, ChatGPT was asked “What are the risks and complications associated with this procedure, and how are they handled?” (Figure 6). Informed consent before a surgical procedure plays a vital legal, ethical, and administrative role in patient care. It ensures that patients fully comprehend the procedure they are about to undertake and agree to accept the outcomes, including any complications that may arise during or as a result of the surgery. Recent studies have demonstrated that the addition of a digital information provision platform improves overall patient understanding, and satisfaction,

Fig. 5 Prompt “Under what circumstances would you perform one or the other?”

PH

Under what circumstances would you perform one or the other?



The decision to perform an open or closed rhinoplasty will depend on the individual case and the specific goals of the surgery.

Open rhinoplasty is typically used for more complex cases or when more precision is needed. It provides the surgeon with a more direct view of the nasal structures, allowing for greater accuracy in making adjustments. Open rhinoplasty may also be used when significant changes need to be made to the tip of the nose or when major reconstruction is required.

Closed rhinoplasty may be used for less complex cases, such as when minor adjustments are needed to the nasal tip or bridge. Closed rhinoplasty may also be preferred when the patient is concerned about visible scarring, as the incisions are made inside the nostrils and are therefore not visible externally.

Ultimately, the decision to perform an open or closed rhinoplasty will depend on a variety of factors, including the patient’s individual needs and goals, the surgeon’s expertise and preference, and the complexity of the surgery. The surgeon will evaluate the patient’s individual case and recommend the technique that is best suited to achieve the desired result.

and reduces consultation time for the surgeon conducting the consent discussion [7, 8]. ChatGPT responded with some complications common to all surgeries and some general complications of rhinoplasty. Risks associated with specific procedures, such as implants, or rare occurrences, such as orbital or endocranial complications, were not listed [9]. Given the impracticality of listing all the conceivable risks, ChatGPT correctly highlighted that the surgeon should be involved in a more in-depth discussion of each case.

The rest of the consultation focused on the postoperative period. ChatGPT was queried “How long of a recovery period can I expect, and what kind of help will I need during my recovery?” (Figure 7). “How can I expect my nose to look over time?” (Figure 8). Finally, “What are my options if I am dissatisfied with the cosmetic outcome of my nose surgery?” (Figure 9).

ChatGPT gave a reasonable estimation of the recovery process, describing swelling and bruising for weeks to months, and advising the avoidance of certain activities. However, the discussion of aesthetic outcomes required a balanced and nuanced approach that we expected would be beyond its scope to emulate. There was an emphasis on having realistic expectations of the result, as well as multiple prompts to discuss the outcome and any dissatisfaction with the treating surgeon, including the availability of secondary procedures. Management of patients’ diverse

operative, social and cultural expectations require empathy and rapport, elements of human interaction that cannot be obtained through text. ChatGPT recognized this limitation and appropriately directed the patient to follow the surgeon’s guidance in all regards during the operative and postoperative period.

Discussion

This exploratory study demonstrates ChatGPT’s understanding of natural language in a health-specific context. It provided coherent answers that were easily comprehended and sufficiently informed. ChatGPT recognized its limitations in providing more esoteric advice, consistently cautioning the patient that each case ought to be evaluated by the surgeon and to follow the surgeon’s instructions pre- and postoperatively.

There is considerable debate in the scientific community regarding the implications of generative AI for science [10]. Machine learning and AI now have a big impact on most aspects of modern life and have seen increasing utilization in the medical field [11]. Deep learning systems have already shown diagnostic capabilities comparable to fully qualified specialists [12]. Before the reveal of ChatGPT in November 2022, IBM’s Watson was another system that used machine learning and natural language

Fig. 6 Prompt “What are the risks and complications associated with this procedure, and how are they handled?”

PH

What are the risks and complications associated with this procedure, and how are they handled?



Like any surgical procedure, rhinoplasty has risks and potential complications. Some risks include:

- Bleeding
- Infection
- Adverse reactions to anesthesia
- Scarring
- Numbness or tingling
- Difficulty breathing
- Unsatisfactory aesthetic results
- Need for revision surgery

Your surgeon will discuss these risks with you in detail during your consultation, as well as any other risks that may be specific to your individual case.

To minimize the risk of complications, it is important to choose a qualified and experienced plastic surgeon who has a thorough understanding of rhinoplasty techniques and who can provide you with realistic expectations about the outcome of the surgery.

If complications do occur, your surgeon will work to address them promptly and effectively. Depending on the nature of the complication, this may involve additional medical treatment or revision surgery. It is important to follow all of your surgeon's instructions before and after the procedure to minimize the risk of complications and to ensure the best possible outcome.

processing to analyse large datasets and provide insights [13]. IBM Watson received considerable public and media attention for its potential applications in cancer management, with treatment recommendations for some cancers demonstrating a level of concordance on par with oncologists in a specialist cancer centre [14]. ChatGPT has already demonstrated a passing performance equivalent to an undergraduate third-year medical school student on the US medical licensing exam [15]. Attempts to test ChatGPT in the clinical setting have resulted in the largely sound provision of antimicrobial advice, appropriate to the diagnosis [16].

The authors sought to explore the performance of ChatGPT in scenarios less reliant on algorithmic decision-making. With a predicted shortfall of 18 million health workers by 2030 as estimated by the World Health Organization (WHO), there is increasing concern for remote and rural populations which have traditionally struggled with healthcare worker retention [17]. Large language models (LLMs), the class of computer systems to which ChatGPT belongs, use deep learning algorithms to analyse language

patterns and predict the sequence of words most likely to follow in a sentence or text passage [18]. With training from diverse internet text sources, ChatGPT can respond to a wide range of topics. There is value in exploring the application of AI models such as ChatGPT in the emerging space of digital clinical guidance. For example, by leveraging advancements in AI language processing with comprehensive medical databases, there is potential to design chatbots capable of providing effective and safe, if generalized, medical advice to patients.

Patient selection and the setting of realistic expectations are two of the key factors in the consultation pathway for aesthetic surgery. This is of particular importance in rhinoplasty, simultaneously one of the most sought after, and most complex procedures in Plastic Surgery [19]. The link between rhinoplasty, psychology, and social environment is well established in the literature, with emphasis placed on the importance of patient selection to avoid not only physical but psychological postoperative complications [20]. While various tools, including a body dysmorphic disorder questionnaire, have been proposed to assist in

Fig. 7 Prompt “How long of a recovery period can I expect, and what kind of help will I need during my recovery?”

PH

How long of a recovery period can I expect, and what kind of help will I need during my recovery?



The recovery period for rhinoplasty can vary depending on the extent of the surgery and your individual healing process. In general, you can expect to experience some swelling, bruising, and discomfort for several days to several weeks following the procedure.

During the first few days following the procedure, you may need to wear a splint or cast on your nose to protect it and help it maintain its new shape. You may also experience some bleeding, nasal congestion, and difficulty breathing, but these symptoms should gradually improve over time.

Your surgeon may recommend that you take time off from work or other activities for a period of time following the surgery to allow for proper healing. You may also need to avoid certain activities, such as heavy lifting or exercise, for a period of time.

It is important to follow your surgeon's post-operative instructions closely to ensure the best possible outcome and to minimize the risk of complications. You may also want to have someone available to help you during your initial recovery period, as you may need assistance with daily tasks or transportation.

Your surgeon will provide you with specific instructions on how to care for your nose during the recovery period and what to expect during each stage of the healing process. They will also schedule follow-up appointments to monitor your progress and ensure that you are healing properly.

Fig. 8 Prompt “How can I expect my nose to look over time?”

PH

How can I expect my nose to look over time?



After rhinoplasty, you can expect your nose to be more symmetrical and proportionate to your other facial features. However, it is important to have realistic expectations about the outcome of the surgery, as the final results may take several months to become apparent.


Immediately following the surgery, you may experience some swelling and bruising, which can make your nose appear larger or differently shaped than you expected. Over the next several weeks to months, this swelling will gradually subside, and you will begin to see the final results of the surgery.

It is important to follow your surgeon's post-operative instructions closely to ensure the best possible outcome and to minimize the risk of complications. You may also want to discuss your expectations with your surgeon before the surgery to ensure that you have a realistic understanding of what the final results will look like. They will be able to provide you with a better idea of what to expect based on your individual case.

patient selection [21], there is no consensus instrument to predict poor outcomes or patient dissatisfaction postoperatively. Accordingly, while AI has enormous potential for

improving healthcare in the areas that rely on algorithmic decision-making, such as diagnostics, resource allocation, and data collection, its application is currently limited in

Fig. 9 Prompt “What are my options if I am dissatisfied with the cosmetic outcome of my nose surgery?”

 What are my options if I am dissatisfied with the cosmetic outcome of my nose surgery?



If you are dissatisfied with the cosmetic outcome of your nose surgery, you may be able to discuss revision surgery with your surgeon. Revision surgery is a secondary procedure that is performed to correct issues with the initial surgery, such as asymmetry or unsatisfactory aesthetic results.

However, it is important to have realistic expectations about the outcome of revision surgery, as it may not be able to fully correct all issues. Revision surgery can be more complex than the initial surgery, and the recovery period may be longer.

Before considering revision surgery, it is important to discuss your concerns with your surgeon and to give them the opportunity to address any issues with the initial surgery. They may be able to suggest alternative treatments or adjustments that can improve your satisfaction with the outcome.

It is also important to choose a qualified and experienced plastic surgeon for both the initial surgery and any revision surgery. They will be able to provide you with a realistic understanding of what to expect and to help you achieve the best possible outcome.

clinical settings where empathy and compassion are paramount.

In the context of rhinoplasty, ChatGPT can serve as a valuable resource for patients seeking information about the procedure, its risks, benefits, and outcomes. Patients can ask questions in natural language and receive immediate responses, which can help to clarify any misunderstandings and set some expectations. ChatGPT can also provide patients with information about the surgeon’s credentials and experience and help them to make informed decisions about their care. Additionally, ChatGPT can assist surgeons by providing them with information about the patient’s medical history and current health status, which can help them in the preoperative assessment and development of an appropriate operative plan. While ChatGPT cannot replace the psychological competency and empathy of a surgeon, it can serve as a valuable adjunct to the consultation process.

Conclusions

This exploratory study provides insights into the utility of AI-generated language models in simulating doctor-patient consultations for rhinoplasty. ChatGPT demonstrated an understanding of natural language in a health-specific context and provided coherent, information, and accessible answers. While it recognized its limitations in providing esoteric and personal advice, it was able to assist patients

with basic information about the procedure, its risks, benefits, and outcomes. ChatGPT can be a valuable resource for patients seeking information and surgeons in preoperative assessment and planning. However, patient selection and setting realistic expectations remain essential factors in the consultation pathway for aesthetic surgery, an area in which the role of current-generation AI remains limited. Further research is needed to explore the potential of AI models such as ChatGPT in digital clinical guidance and the broader healthcare context.

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Declarations

Conflict of interest The authors declare that they have no conflicts of interest to disclose.

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Informed Consent For this type of study informed consent is not required.

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