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RESEARCH ARTICLE

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RELIABILITY OF ARTIFICIAL INTELLIGENCE IN OPHTHALMIC ANESTHESIA

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ABSTRACT

Chat GPT, which stands for Chat Generative Pre-Trained Transformer, is a large language model-based chatbot developed by Open AI and launched on November 30, 2022, which enables users to refine and steer a conversation towards a desired length, format, style, and level of detail, and language used. It enables the user to get answers to any questions including medical questions. In our study it was seen that the opinion given by the AI based on our input is reliable to the extent of 95% i.e. comparable to human beings. The only difference is that human beings can continuously monitor the situation and change accordingly while the AI response is based on the inputs given by we people- the human.

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INTRODUCTION

Each doctor is an intelligent person and has his own professional opinion. He has reasoning and logic behind it; thus, his opinion is reliable. But now, another entity is also there i.e., Artificial Intelligence (AI). How far, its opinion is reliable is the purpose of this paper. We have used the Chat GPT platform of AI for this assessment. Chat GPT, which stands for Chat Generative Pre-Trained Transformer, (Zhou) is a large language model-based chatbot developed by Open AI and launched on November 30, 2022, which enables users to refine and steer a conversation towards a desired length, format, style, and level of detail, and language used. It enables the user to get answers to any questions including medical questions. (Chat, 2023). Many studies to find the accuracy of answers given by Chat GPT have been done (Ariyaratne, 2023; Bhattacharyya, 2023 and Athaluri, 2023). Its procedure is very simple. Open the Chat GPT page on your search engine. Register your account & log in. Then type your query as prompt in a proper sentence with all the details. And in seconds, the results will be there. To know, what are the advantages of ChatGPT over Google. We asked this question to Google as well as chat GPT.

When we typed ChatGPT versus Google on Google, the following was the first response:

While ChatGPT generates conversational texts, Google searches the Internet to provide relevant results on keywords.

ChatGPT uses deep learning and a transformer architecture to generate human-like responses to user prompts.

Then we entered the following prompt on ChatGPT:

"In comparison to Google search engine, what are 5 main benefits or differences of ChatGPT"

ChatGPT and Google Search are two different tools designed for distinct purposes, and they offer unique benefits and differences. Here are five main benefits or differences of ChatGPT compared to Google Search:

1. **Conversational Interaction:** ChatGPT is designed for conversational interactions. You can have a dynamic conversation with it, asking questions, seeking explanations, and getting responses conversationally. Google Search, on the other hand, provides a list of search results based on keywords and doesn't engage in conversations.
2. **Contextual Understanding:** ChatGPT is capable of understanding and maintaining context over a series of interactions. It can provide relevant responses based on the context of the conversation, making it useful for more complex queries and discussions. Google Search provides static search results without a deep understanding of context.
3. **Multi-turn Conversations:** ChatGPT can handle multi-turn conversations, which means you can ask follow-up questions and have a back-and-forth dialogue. Google Search provides

information on a single search query and doesn't facilitate ongoing conversations.

4. **Information Synthesis:** ChatGPT can generate human-like responses and provide explanations, summaries, and information synthesis. It can generate content that is not directly available on the web and can provide subjective opinions or creative responses. Google Search primarily retrieves information available on the internet but doesn't generate content.
5. **Customization and Integration:** ChatGPT can be customized and integrated into various applications and services to provide tailored conversational experiences. It can be used for chatbots, virtual assistants, and more. Google Search, while customizable to some extent, primarily serves as a standalone search engine and does not offer the same level of customization for conversational purposes. While ChatGPT has these advantages for conversational interactions, Google Search remains a powerful tool for quickly finding information on the internet. The choice between them depends on the specific task or use case. For complex, conversational queries and interactions, ChatGPT can be more suitable, whereas Google Search is ideal for quickly retrieving web-based information.

We have formulated five questions related to Ophthalmic Anaesthesia. We issued the following prompts on the chatGPT platform and the responses received are mentioned along with.

For a 60 year Male Cataract patient, out of retrobulbar and peribulbar anaesthesia, which is safer for the patient and more convenient for the surgeon

Both retrobulbar and peribulbar anaesthesia are commonly used techniques for providing anesthesia during cataract surgery. The choice between the two depends on several factors, including the patient's medical history, the surgeon's preference and experience, and the specific circumstances of the surgery. There isn't a one-size-fits-all answer, and the decision should be made in consultation with the patient's ophthalmologist or surgeon.

Here's a brief overview of both techniques:

1. Retrobulbar Anesthesia:

- Retrobulbar anesthesia involves injecting a local anesthetic agent behind the eye, typically into the retrobulbar space, which is located behind the eyeball.
- It provides a rapid onset of anesthesia and complete akinesia (immobility) of the eye.
- It is typically used for more complex or longer surgeries because it provides better anesthesia and akinesia.
- Retrobulbar anesthesia may have a higher risk of complications, including retrobulbar hemorrhage, globe perforation, and optic nerve injury. It requires careful administration and monitoring

Peribulbar Anesthesia:

- Peribulbar anesthesia involves injecting a local anesthetic around the eye, but outside the muscle cone that surrounds the eyeball.
- It is considered to be safer than retrobulbar anesthesia, with a lower risk of complications.
- Peribulbar anesthesia provides adequate anesthesia for most routine cataract surgeries.
- It may not provide complete akinesia, which can be a limitation in certain cases.

For a 60-year-old male cataract patient, both techniques can be considered, but the choice should be based on the individual patient's needs and the surgeon's assessment. Safety and convenience for the patient and surgeon depend on various factors, including the patient's general health, any specific concerns or preferences, and the surgeon's expertise with each technique. The patient needs to discuss with their

surgeon to understand the benefits and risks associated with each anesthesia technique and make an informed decision that takes their unique circumstances into account. The surgeon will consider the patient's overall health, any contraindications, and the complexity of the surgery when making a recommendation.

For a 60-year-old Male Cataract patient, out of sub-tenon and peribulbar anesthesia, which is safer for the patient and more convenient for the surgeon.

Both sub-Tenon's and peribulbar anesthesia are commonly used techniques for cataract surgery and are generally considered safe for most patients. The choice between these two techniques should be made based on the individual patient's needs, the surgeon's preference, and the specific circumstances of the surgery. Here's an overview of both techniques:

Sub-Tenon's Anesthesia

1. Sub-Tenon's anesthesia involves injecting a local anesthetic agent into the space between the conjunctiva (the clear tissue covering the white of the eye) and the Tenon's capsule (a fibrous tissue that surrounds the eye).
2. It provides good anesthesia for cataract surgery and is associated with a lower risk of complications compared to retrobulbar anesthesia.
3. Sub-Tenon's anesthesia typically does not cause complete akinesia (immobility) of the eye, but it provides sufficient anesthesia for most routine cataract surgeries.
4. It is often preferred for its safety profile and patient comfort.

Peribulbar Anesthesia

1. Peribulbar anesthesia involves injecting a local anesthetic around the eye but outside the muscle cone that surrounds the eyeball.
2. It provides anesthesia for cataract surgery and may be used when complete akinesia is not required.
3. Peribulbar anesthesia has a good safety record but may carry a slightly higher risk of complications compared to sub-Tenon's anesthesia.

For a 60-year-old male cataract patient, both sub-Tenon's and peribulbar anesthesia can be considered safe options. The choice between the two depends on the patient's overall health, any specific concerns or preferences, and the surgeon's experience and judgment. Both techniques are generally convenient for the surgeon, but sub-Tenon's anesthesia is often preferred for its safety profile and patient comfort. Ultimately, the patient should have a discussion with their surgeon to determine which anesthesia technique is most appropriate for their specific case. The surgeon will consider the patient's medical history, any contraindications, and the complexity of the surgery when making a recommendation. Patient comfort and safety are top priorities in choosing the anesthesia technique for cataract surgery

For a 60-year-old Male Cataract patient, out of topical and peri bulbar anesthesia, which is safer for the patient and more convenient for the surgeon.

Both sub-Tenon's and peribulbar anesthesia are commonly used techniques for cataract surgery and are generally considered safe for most patients. The choice between these two techniques should be made based on the individual patient's needs, the surgeon's preference, and the specific circumstances of the surgery. Here's an overview of both techniques:

1. Sub-Tenon's Anesthesia:

- Sub-Tenon's anesthesia involves injecting a local anesthetic agent into the space between the conjunctiva (the clear tissue covering the white of the eye) and the Tenon's capsule (a fibrous tissue that surrounds the eye).
- It provides good anesthesia for cataract surgery and is associated with a lower risk of complications compared to retrobulbar anesthesia.

- Sub-Tenon's anesthesia typically does not cause complete akinesia (immobility) of the eye, but it provides sufficient anesthesia for most routine cataract surgeries.
- It is often preferred for its safety profile and patient comfort.

2. Peribulbar Anesthesia:

- Peribulbar anesthesia involves injecting a local anesthetic around the eye but outside the muscle cone that surrounds the eyeball.
- It provides anesthesia for cataract surgery and may be used when complete akinesia is not required.
- Peribulbar anesthesia has a good safety record but may carry a slightly higher risk of complications compared to sub-Tenon's anesthesia.

For a 60-year-old male cataract patient, both sub-Tenon's and peribulbar anesthesia can be considered safe options. The choice between the two depends on the patient's overall health, any specific concerns or preferences, and the surgeon's experience and judgment. Both techniques are generally convenient for the surgeon, but sub-Tenon's anesthesia is often preferred for its safety profile and patient comfort. Ultimately, the patient should have a discussion with their surgeon to determine which anesthesia technique is most appropriate for their specific case. The surgeon will consider the patient's medical history, any contraindications, and the complexity of the surgery when making a recommendation. Patient comfort and safety are top priorities in choosing the anesthesia technique for cataract surgery.

For a 60-year-old Male Cataract patient, out of topical and peribulbar anesthesia, which is safer for the patient and more convenient for the surgeon.

Topical anesthesia and peribulbar anesthesia are both commonly used techniques for cataract surgery, and the choice between them depends on various factors, including the patient's medical history, the surgeon's preference and experience, and the specific circumstances of the surgery. Here's an overview of both techniques:

1. Topical Anesthesia (also known as "topical drops" or "ophthalmic drops"):

- Topical anesthesia involves the use of anesthetic eye drops to numb the surface of the eye, without the need for injections around the eye.
- It is typically used for routine cataract surgeries and is considered safe for many patients, including those with stable medical conditions.
- Topical anesthesia offers a relatively quick and comfortable recovery for the patient.
- The surgeon may use additional intracameral (intraocular) anesthesia during the surgery to maintain patient comfort.

Peribulbar Anesthesia:

- Peribulbar anesthesia involves injecting a local anesthetic around the eye but outside the muscle cone that surrounds the eyeball.
- It provides excellent anesthesia and akinesia (immobility) of the eye and is suitable for more complex or longer surgeries.
- Peribulbar anesthesia is generally safe but requires an injection near the eye, which may carry a slightly higher risk of complications compared to topical anesthesia.

For a 60-year-old male cataract patient, both topical anesthesia and peribulbar anesthesia can be considered safe options. The choice between the two depends on the patient's specific circumstances and the surgeon's assessment. Here are some factors to consider:

1. **Patient Preference:** Some patients may prefer topical anesthesia because it avoids injections and is generally less invasive.
2. **Surgical Complexity:** The complexity of the cataract surgery may influence the choice of anesthesia. Topical anesthesia is suitable

for routine cataract cases, while peribulbar anesthesia may be preferred for more complex surgeries.

3. **Surgeon's Experience:** The surgeon's expertise and experience with each technique may influence the choice of anesthesia.
4. **Patient's Medical History:** The patient's overall health and any contraindications to one technique or the other should be considered.
5. **Surgeon-Patient Discussion:** The patient needs to have a discussion with their surgeon to determine which anesthesia technique is most appropriate for their specific case.

Both topical and peribulbar anesthesia can be convenient for the surgeon, but the choice should prioritize patient comfort and safety. The surgeon will make a recommendation based on the individual patient's needs and the specific requirements of the surgery.

In a 60-year-old Male Cataract patient, along with peribulbar anesthesia, drugs can be given before peribulbar anesthesia to relieve pain & anxiety.

In a 60-year-old male cataract patient undergoing cataract surgery with peribulbar anesthesia, several medications may be administered before the procedure to relieve pain and anxiety. These medications are typically given to ensure the patient's comfort and relaxation during the surgery. The specific medications and dosages should be determined by the anesthesiologist or ophthalmologist based on the patient's medical history, allergies, and overall health. Common medications that may be used include:

1. Anxiolytics (Anti-anxiety Medications):

These drugs help reduce anxiety and promote relaxation. Common options include:

- **Midazolam:** A short-acting benzodiazepine that can be given intravenously to induce sedation and reduce anxiety.
- **Diazepam:** Another benzodiazepine that may be administered orally or intravenously to alleviate anxiety.

2. Analgesics (Pain Relievers):

These drugs help manage pain and discomfort. Common options include:

- **Acetaminophen (Paracetamol):** It is a mild pain reliever and can be given orally or intravenously.
- **Nonsteroidal Anti-Inflammatory Drugs (NSAIDs):** These can be used to control pain and inflammation, but they should be used cautiously, considering the patient's medical history and any potential interactions with other medications.

3. Opioid Analgesics:

These stronger pain relievers may be considered for more significant discomfort or if the surgery is expected to be lengthy. Common options include:

- **Morphine or Fentanyl:** These opioids can be administered intravenously.

4. Antiemetics:

To prevent nausea and vomiting, especially if opioids are used, antiemetic medications like ondansetron may be given.

5. Local Anesthetic:

A small amount of local anesthetic may be injected under the skin at the site of the peribulbar injection to minimize discomfort during the initial injection.

6. Intravenous Fluids:

Intravenous fluids may be administered to maintain hydration and blood pressure stability.

The healthcare team needs to monitor the patient closely during the administration of these medications and throughout the surgical procedure. They will adjust the medications and dosages as needed to ensure the patient's comfort and safety. The choice of medications and their doses will depend on the patient's individual needs and medical history, so the patient needs to communicate any allergies or sensitivities to the medical team. Additionally, the patient should follow any preoperative fasting instructions provided by the healthcare team to minimize the risk of complications during anesthesia and surgery.

In a 60-year-old Male Cataract patient, planned for peri bulbar anesthesia, what precautions can we take to avoid chemosis and black eye due to hemorrhage?

To minimize the risk of complications like chemosis (swelling of the conjunctiva) and black eye (periocular hemorrhage) in a 60-year-old male cataract patient undergoing peribulbar anesthesia for cataract surgery, several precautions and techniques can be employed by the surgical and anesthesia teams. Here are some precautions to consider:

1. Careful Injection Technique:

- The anesthesia provider should use a precise and careful injection technique to minimize trauma to the tissues around the eye.
- Slow and controlled injection can reduce the risk of vessel damage and subsequent hemorrhage.

2. Patient Positioning:

- Proper positioning of the patient can help prevent blood from pooling around the eye.
- Elevating the head of the surgical table slightly may reduce venous congestion around the eye.

3. Pressure on the Injection Site:

- Applying gentle pressure on the injection site immediately after the injection can help control bleeding and reduce the risk of hemorrhage.

4. Cold Compresses:

- Applying cold compresses to the eye after the injection can help minimize postoperative swelling and reduce the risk of chemosis and black eye.
- Cold compresses should be used intermittently, and care should be taken to avoid excessive pressure on the eye.

5. Monitoring and Observation:

- Close monitoring of the patient's vital signs and the surgical site during and after the procedure is crucial.
- Prompt recognition of any signs of bleeding or complications allows for rapid intervention.

6. Use of Hemostatic Agents:

- In some cases, hemostatic agents may be used during the procedure to minimize bleeding.
- These agents are used cautiously and under the supervision of the surgical team.

7. Patient Counseling:

- The patient should be informed about the potential side effects of the procedure, including the possibility of chemosis and black eye.
- Managing patient expectations and addressing concerns can help reduce anxiety.

8. Postoperative Care:

- Postoperatively, patients should be advised to avoid excessive rubbing or pressure on the treated eye.
- The use of lubricating eye drops may help reduce irritation and promote healing.

9. Follow-up Care:

- Schedule a follow-up appointment to assess the patient's condition and address any concerns or complications.

It's important to note that while these precautions can help reduce the risk of chemosis and black eye, some degree of postoperative swelling and bruising is possible and may vary from patient to patient. Complications are relatively rare with peribulbar anesthesia when performed by experienced healthcare providers, and the benefits of the anesthesia technique in providing comfort and anesthesia during cataract surgery generally outweigh the risks.

In a 60-year-old Male Cataract patient, planned for peri bulbar anesthesia, what precautions can we take to avoid chemosis and black eye due to hemorrhage?

When performing peri-bulbar anesthesia for cataract surgery in a 60-year-old male patient, it's important to take precautions to minimize the risk of complications such as chemosis (swelling of the conjunctiva) and hemorrhage. Here are some precautions and steps you can take to avoid these issues:

1. Patient Assessment:

- Perform a thorough preoperative assessment to evaluate the patient's general health, coagulation status, and any preexisting conditions that may increase the risk of bleeding or complications.

2. Informed Consent:

- Ensure that the patient understands the potential risks and complications associated with peri-bulbar anesthesia, including chemosis and hemorrhage, and obtain informed consent.

3. Proper Technique:

- Use a skilled and experienced anesthesiologist or ophthalmologist who is proficient in performing peri-bulbar anesthesia.

4. Preoperative Medication:

- Review the patient's medications and medical history to identify any drugs that might increase the risk of bleeding (e.g., anticoagulants or antiplatelet agents). Consult with the patient's primary care physician or cardiologist to determine whether any medications need to be adjusted or temporarily discontinued before the procedure.

5. Ocular Surface Preparation:

- Ensure that the patient's eye is adequately prepared for the procedure, including proper cleaning and sterilization. Use sterile techniques to minimize the risk of infection.

6. Gentle Injection:

- Administer the peri-bulbar anesthesia with gentle and precise injection techniques to minimize trauma to the tissues surrounding the eye.

7. Monitor for Hemorrhage:

- During and after the injection, closely monitor the patient for any signs of hemorrhage, including excessive bleeding or increased intraocular pressure. Be prepared to address any bleeding promptly.

8. Compression:

- Apply gentle pressure on the eye following the anesthesia injection to help control bleeding and reduce the risk of chemosis.

9. Positioning:

- Position the patient correctly during the procedure to minimize the risk of blood pooling or excessive pressure on the eye.

10. Postoperative Care:

- After the procedure, provide appropriate postoperative care, including monitoring for complications such as chemosis and hemorrhage. Instruct the patient to avoid rubbing the eye and to follow any postoperative care instructions diligently.

11. Emergency Preparedness:

- Be prepared for potential complications and have the necessary equipment and medications on hand to manage emergencies, such as severe hemorrhage.

12. Documentation:

- Thoroughly document the procedure, any complications, and the steps taken to address them in the patient's medical records.

It's essential to tailor your approach to each patient's individual needs and medical history and to have a well-trained and experienced team in the operating room to ensure the best possible outcome and minimize the risk of complications. Consulting with an ophthalmologist or anesthesiologist with expertise in cataract surgery and peri-bulbar anesthesia is advisable for complex cases or patients with specific medical concerns.

Following this, we checked the reliability of this data. We sent this data to Ophthalmologists and anesthesiologists and asked them to give opinions on a scale of 1-5: 1 Strongly disagree, 2 disagree, 3 neutral, 4 agree and 5 strongly agree.

Following is the response

Prompt	Response
Retrobulbar vs. peribulbar anesthesia	
Sub Tenon vs. Peribulbar anesthesia	
Topical vs. Peribulbar anesthesia	
Anxiolytics with Peribulbar anesthesia	
Measures to avoid Chemosis and hemorrhage in Peribulbar anesthesia	

We also repeated the last question after some gap. Its second response was slightly different and more explicit.

DISCUSSION

It shows that the opinion given by the AI based on our input is reliable to the extent of 95% i.e. comparable to human beings.

The only difference is that human beings can continuously monitor the situation and change accordingly while the AI response is based on the inputs given by we people- the human.

AI has helped us a lot of us professionals but at the same time, it can trouble us too, when used by litigants and internet patients.

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