What is general anesthesia, & why it matters to patients & surgeons

(0:00 - 2:10)

Do you know what the definition of general anaesthesia is? If you think it's defined by the presence of an endotracheal tube like this, it's actually a little bit more nuanced than that. My name is Max Feinstein and I'm an anaesthesia resident at the Mount Sinai Hospital in New York City. In this video, I'm going to be talking about the different depths of anaesthesia and why it matters to patients, surgeons, and anesthesiologists.

If you find this video interesting or helpful, I'd really appreciate it if you liked it and subscribe to the channel. Let's dive in. Contrary to what a lot of people's intuition would tell them, the depth of anaesthesia is not defined by equipment or medications, but actually hinges on the patient's responsiveness to either verbal or tactile stimuli, including painful stimuli.

Anaesthesia can really be considered as a continuous spectrum from light to deep, and it's broken up into four categories by the American Society of Anesthesiologists. The lightest category is called minimal sedation. Using the patient's responsiveness as the defining feature of minimal sedation, we would say that patients will be responsive to verbal stimuli.

So that means that I can verbally address the patient and they should talk right back to me. Other features of minimal sedation, which I don't view as the defining features, are that both breathing and cardiovascular status are completely unaffected. Typically, light sedation is administered for minor procedures where we want to help the patient with a little bit of anxiolysis, but they're definitely not going to be asleep and it's likely that they're going to remember the entire experience.

It's worth pointing out that amnesia is not a defining feature of any level of anaesthesia because there's no way for us to know whether or not a patient is amnestic until after the fact and we evaluate the patient and see what they remember. The next depth of anaesthesia is called moderate sedation, and this is commonly referred to as conscious sedation. The defining feature of moderate sedation is that a patient is purposefully responsive to either verbal or tactile stimulus.

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With moderate sedation, a patient is expected to breathe on their own and it's mostly expected that their cardiovascular function remains completely intact. Next up is deep sedation, which is defined as a purposeful response to repeated or painful stimulus. When a patient's receiving deep sedation, we typically expect there might be some compromise to both their respiratory function and their cardiovascular function requiring some type of support.

Respiratory support can refer to a lot of different interventions that anesthesiologists can do to

support breathing, and one that's pretty common during deep sedation is the insertion of something called an oral airway that can go into a patient's mouth and help keep the mouth open so that air can exchange easily because when people are sedated they tend to have a collapse of a lot of the tissue in their mouth which makes it a little more difficult to breathe on their own. A common intervention for cardiovascular support during deep sedation might be the administration of a vasopressor like phenylephrine or norepinephrine. The deepest level of anaesthesia is called general anaesthesia and the definition that you came here for is a patient who is not responsive even to painful stimulus.

A really subtle but important distinction here is talking about purposeful responsiveness, so it is possible for a patient to be under general anaesthesia and flinch very slightly if there is a painful stimulus that occurs, for example an incision is being made. This is actually a nidus of miscommunication in the operating room between anesthesiologists and surgeons because sometimes if there is a little bit of non-purposeful movement when a patient is under general anaesthesia a surgeon might think that the patient is waking up and just about to open their eyes and walk out the door of the operating room when in reality we know based on parameters that we're monitoring on the anaesthesia side of things the patient is definitely under general anaesthesia and the movement that we saw was non-purposeful movement in response to a painful stimulus. Obviously there is nobody who is more concerned about making sure that a patient who's supposed to be under general anaesthesia is actually under general anaesthesia than the anesthesiologist and so this is a huge part of our training and you can actually check out this video right here where I go into a lot of detail discussing how we ensure that a patient under general anaesthesia is in fact under general anaesthesia and for general anaesthesia we typically expect that we will need to intervene to maintain respiratory status and it's possible we'll need to intervene in order to maintain cardiovascular status.

While it is pretty common to use an endotracheal tube to maintain respiratory status while a patient's under general anaesthesia there are a lot of different ways that we can manage respiratory status including a laryngeal mask airway which goes inside the mouth but does not pass through the vocal cords or we can even in some cases use an oral airway or on very rare occasion it's actually possible to maintain general anaesthesia with a patient breathing completely on their own. General anaesthesia is the depth of anaesthesia that's selected for many different types of invasive surgeries for example laparoscopic cholecystectomy or spine surgery and it's worth pointing out that if a patient is under general anaesthesia then the expectation is that they will have absolutely no memory of anything that goes on while they're under general anaesthesia. There are many different anaesthetic agents that we have available to get patients to the desired depth of anaesthesia for example midazolam, fentanyl, propofol, isoflurane, sevoflurane, dexmedetomidine, the list goes on.

The choice of which medication to use is based on a lot of factors and one important one is whether it has any specific property that we want the patient to experience the effect of. For example if a patient is about to undergo a very painful procedure then we would want to include an analgesic for example fentanyl but it's not always the case that a procedure that a

patient's going to undergo will be very painful so a medication like propofol could be useful. It's worth pointing out that propofol does cause decreased level of consciousness or even general anaesthesia but propofol does not in and of itself provide any analgesia.

The effects that these medications have on a patient is going to be dependent on a lot of factors including what dose of medication, how long it's being given for, how much the patient weighs, how old the patient is, how much adipose tissue the patient has, and a lot of other factors which essentially boil down to the reason why anaesthesia is a complex endeavour. While there are a lot of different options for anaesthetic medications I will just say that the cornerstone medications for general anaesthesia tend to be either propofol and or anaesthetic gas like isoflurane or sevoflurane. These are often supplemented with other medications but I would say those are pretty much going to be the foundations for any plan that includes general anaesthesia.

I'll also just point out that propofol can be dosed to give a general anaesthetic depth. It's also possible for propofol to be dosed for any level of sedation. As far as paralysis is concerned we only administer paralysing agents when a patient is under general anaesthesia which is a plane of anaesthesia where they are not going to have any awareness or recall of anything that's going on.

Paralysis is not always used for general anaesthesia but it is used in cases where it will help either from an anaesthetic and or surgical standpoint to have the patient paralysed. There's a lot that goes into becoming a doctor and something that would have helped me a lot through my journey to becoming an anesthesiologist is Wisent who happened to be the sponsor of today's video. Wisent is a website with tens of thousands of tutors for practically every subject imaginable including those related to medicine.

Their tutors can help out with virtually every aspect of medical education ranging from the application process for medical school residency to specific subject tutoring like biology or physics or even subjects in medical school all the way to test preparation like getting ready to take the MCAT or USMLE step one and two and so forth. And if you're interested in subjects outside of medical education Wisent has pretty much everything under the sun for example video editing which I happen to use and that helped me bring my video editing skills from this type of video that I made a couple years ago. What's up everybody? My name is Max Feinstein and I'm an... two videos that I personally think are much nicer looking and are also much faster for me to make because I've learned how to use my editing software more efficiently.

I personally have found Wisent to be very helpful and think that you would too so click the link in the description below and get $25 off your first tutoring lesson. Now I just need to see about getting some dog training classes for Kobe whose acting skills are a little lacklustre. Anyways when patients come in to have procedures done under anaesthesia I think it's all about expectations and in my experience patients are typically the most concerned with how much pain they will or won't feel and how much they will or won't have awareness about anything

that's going on.

If a patient comes in and expects that they are not going to have any awareness or recall of anything that goes on during their procedure but then they later recall having heard some sounds or having seen something even if it wasn't painful it can still be extremely traumatising and understandably so. When I am walking my patients through the informed consent process prior to anaesthetizing them I always make it abundantly clear what type of anaesthesia they're going to receive and what that experience is going to be like for them and the key distinctions that I make sure to bring up are whether a patient will be under some form of light moderate or deep sedation where they may have some awareness of what's going on and they may have some recall about what's going on or if they're going to be under general anaesthesia in which case I tell them that they will be completely unaware of anything that's going on and will have no memory of what's going on. When I do let patients know that the anaesthetic plan entails light moderate or deep sedation and they may have some awareness I do let them know that I'm going to be right there the entire time and if I need to give them more medication to get them sleepier or more comfortable I'll be right there to do that immediately.

Surgeons tend to have a very different perspective on depths of anaesthesia as it pertains to providing an optimal surgical field for them. There are many different types of procedures where it's not necessary for a patient to be completely motionless during surgery but then there are a lot of different types of procedures where a surgeon needs for a patient to be completely paralysed. It's just really important for surgeons and anesthesiologists to be communicating effectively about what the surgical needs are because if a surgeon says that sedation is fine and then halfway through the surgery they're complaining that the patient is moving and they want the patient paralysed well you can't paralyse a patient unless they're under general anaesthesia and you already told me that you're fine with sedation instead of general anaesthesia.

You see where the confusion comes up. Anyways if you're a surgeon watching this video then the big favour that I would ask of you is to determine whether or not you need a patient to be motionless and then based on the answer to that question you can help the anesthesiologist figure out what type of anaesthesia to provide. The other thing is if you're a surgeon watching this video then have you considered transferring to anesthesiology? It's a pretty great field.

You should really think about it. The reason why dialling in the perfect depth of anaesthesia is important to anesthesiologists has to do not only with the patient factors like comfort and expectations and not only the surgical factors like providing an optimal surgical environment but other additional factors like making sure that the patient's cardiopulmonary function is preserved along with lots of other considerations that come along with the patient's physiology. Generally speaking any painful insult that a patient experiences whether or not they have any conscious awareness of this painful insult is going to increase their sympathetic tone which means increasing cardiac output, clamping down on systemic vascular resistance and lots of other downstream effects.

For a young and otherwise healthy patient this might not be a problem at all but many of the patients who we take care of are critically ill and any sort of perturbation of their cardiovascular status may lead to cardiovascular collapse. For that reason it's really important to make sure that the amount of anaesthesia that we have on board is going to be enough to appropriately blunt any type of potentially dangerous sympathetic response that a patient may experience. Respiratory status is also critically important.

For example a patient who has severe pulmonary hypertension might not be a great candidate for moderate or deep sedation which could slow down their respiratory rate which could in turn exacerbate their underlying pathology and lead to say right-sided heart failure. It's safe to say that pretty much every organ system is affected by the different depths of anaesthesia so when we're tailoring an anaesthetic plan to a patient we're taking into consideration what underlying pathologies they have and whether or not the anaesthesia is going to create any changes to those pathologies. If you enjoyed this video about general anaesthesia in human beings you might really like this video in which I shadow a veterinary anesthesiologist and learn about general anaesthesia in dogs.

Thanks very much for watching. I'll see you next time.