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Indications for Kyphoplasty and Vertebroplasty

ANNOUNCER OPEN:
Welcome to CME on ReachMD. This segment, entitled *Indications for Kyphoplasty and Vertebroplasty* is provided by Prova Education and the Roswell Park Cancer Institute as well as through the generous support of BlueCross BlueShield of Western New York.

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Dr. Alberico:

Good afternoon. My name is Ronald Alberico. I am the Director of Neuroradiology at the Roswell Park Cancer Institute. Today's talk is about the Indications for Kyphoplasty and Vertebroplasty.

Today's learning objectives are:

- To summarize what percutaneous vertebral augmentation techniques are available and the differences between them.
- To identify patients who may benefit from treatment.
- To demonstrate an understanding of the preoperative and postoperative workup for the patients and the expected results.

Percutaneous injection of a polymerizing agent into a vertebral body that's fractured is the generic term for percutaneous vertebral augmentation. If you use a balloon to help it's called kyphoplasty. Without the use of balloons it's called vertebroplasty.

So, what exactly is kyphoplasty and vertebroplasty? It involves injecting a polymerizing agent into a fractured vertebral body using image guidance. The most commonly used agent is polymethyl methacrylate or PMMA. For kyphoplasty, a balloon tamp is first inserted into the vertebral body and inflated in an effort to reshape the vertebral body and create a shape of bone that is more toward the normal appearance and also create a space for the delivery of the PMMA. For vertebroplasty, the process is done with no use of a balloon.

Vertebroplasty has certain advantages. Generally, the delivery system is smaller; you can use a 13-gauge needle, so that makes the procedure less invasive. It's faster because it skips a step of inflating the balloon and placing the balloon. It may be possible, therefore, in patients who have more difficulty being sedated for the kyphoplasty or more difficulty in terms of the shape of the vertebral body.

In this image, the needle is placed into the anterior inferior aspect of the bone and the methyl methacrylate is injected which shows up as dark on the x-rays and this can be monitored during the procedure.

Disadvantages include less control over the delivery of the PMMA. Without the balloons to help, you may have more extravasation of the PMMA outside of the bone and that typically can cause a lower injection volume. There is also no effort to actually change the shape of the bone without the use of the balloons.

Advantages of kyphoplasty are you have better control over the PMMA delivery through cavity creation from the balloon, diversion of the cement path by use of the balloons, and other protection techniques. The potential for fracture reduction is show in this diagram where the balloon is inserted into the broken vertebral body and inflated in an effort to bring the parallel endplates back toward their normal shape. Flexible injection options include the ability to create a cavity that is lined by polymethyl methacrylate and allow that methyl methacrylate to harden before injecting the rest of the dose, and you can deliver more cement, more frequently, with less extravasation using that technique.

Kyphoplasty disadvantages include the delivery system size which is generally larger; you generally need either a 10-gauge or an 8-gauge needle for this system, the equipment is more expensive, and you have to be trained in order to do the process, although most operators that do kyphoplasty were first started in vertebroplasty and the training process is rather trivial for them.

Indications. Patients who have painful vertebral compression fractures, either due to osteoporotic fractures, traumatic fractures, or pathologic fractures from cancer or other causes are candidates for the procedure. Acute fractures with pain clinically corresponding to the fracture level are the best to treat. Chronic pain, despite medication, is also likely to respond to therapy. Progression of vertebral fractures over time without, or with pain, is also an indication for treatment. If the fracture is progressing the methyl methacrylate can prevent that from occurring and prevent possible impingement upon the spinal canal if the fracture continues to progress.

Patients who cannot have kyphoplasty or vertebroplasty are those who are actively infected. Typically we wait at least two weeks after infection is cleared off of antibiotics before considering treatment. Some patients have an inability to tolerate conscious sedation. Those patients would either require a general anesthesia or require some other therapy besides vertebral augmentation. If you have an epidural mass or posteriorly displaced bone that's compromising the spinal canal by more than 50%, these procedures can make the situation worse and are contraindicated. Relative contraindications include thrombocytopenia which would need to be corrected first with platelet infusions, and we like to have the platelet level at least 80,000 before we treat. Posterior wall dehiscence is a gap in the bone posteriorly in the vertebral body adjacent to the spinal cord or the nerve roots. This is a relative contraindication because things can be done to control the cement delivery and avoid having it leak through the gaps, if you're aware of the gaps.

That brings up the preoperative assessment of the patient. Physical exam is key to exclude contraindications and to identify those patients who have pain related to the fractures. As an operator, I prefer to do that as a consulting physician. I will see the patients preoperatively in the clinic and do a complete thorough examination to determine if the pain is related to the fracture; will do imaging if necessary with CT or MRI to assess the posterior vertebral wall and look for epidural masses; and we'll assess other risks that could be a potential cause of problems during the procedure including any risk to anesthesia, any comorbid problems the patient may have. We also look for potential sources of pain other than the fracture including disk herniations, spondylosis, and metastases.

On the day of the procedure, most patients are done as an outpatient. I've done one inpatient in the course of the last 9 years and that patient was discharged early the next morning with no problems. Usually 1 to 4 levels are treated in a single setting. If it's greater than 4 levels necessary to treat, we'll usually do it in a staged operation with 2 different settings. The procedure lasts 1 to 2 hours and the recovery time is between 2 and 4 hours. The patient goes home the same day. I encourage walking and they usually are maintained with their usual pain medications. If they're not on pain medications, I'll prescribe a Lortab for 10 days p.r.n. for treatment of pain.

Postop recovery. The day of the procedure, the patient usually has less pain than they did when they started because of the onboard lidocaine and sedation. Pain will spike for the patient on day 2 and they should expect relief of pain within 3 to 4 days after the procedure. I limit their activity to lifting no more than 5 pounds in the first 2 weeks after the procedure. After that, they can go down to their baseline activity level. It is important to stress to the patients that their fractures indicate a weakness of the vertebral bodies in general, and because their pain is gone it does not make them less likely to fracture other levels, because the preexisting condition is still present. I encourage walking for postoperative recovery time and as a form of physical therapy. They can shower the day of the procedure, but they're not to submerge the wounds for 2 weeks following the procedure. I follow up with them in clinic again 2 weeks after the procedure.

At Roswell Park we've done more than 1200 levels in the last 9 years. In our properly selected patient population, 85% of our patients have pain relief after the procedure with 40% having excellent relief, meaning they stop their pain medicines for their back pain, 25% have decreased their pain medicine and have relief to some degree, 20% have an improvement in their ability to do daily activities and to sleep, but are still taking their level of pain medication from before. Of course, the top 40% and the 25% also have improved activity and sleep.

Complication rate. Symptomatic complications are less than 0.1% and asymptomatic complications defined as leakage of the methyl methacrylate outside of the vertebral body are approximately 4 to 5%.

In conclusion, percutaneous vertebral augmentation can be done with or without balloon assistance. Balloon assistance provides better control of cement delivery, but has the disadvantage of having requirement for more training, a more expensive system, and a larger diameter needle necessary for treatment. Patients who benefit from treatment have painful vertebral compression fractures or compression fractures that are progressive over time. Up to 85% of patients treated have pain relief within 3 to 4 days of the procedure.

Thank you very much for your attention. My name is Dr. Ronald Alberico at Roswell Park Cancer Institute. If you have any further questions, feel free to call Roswell Park or visit RoswellPark.org.

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