**Vertebral Artery Dissection And Chiropractic Care**

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On February 4, 2016 Ms. Katie May, a well-known social media figure died of infarction of the brain that developed secondary to bilateral vertebral artery dissections. Her circumstances, prior to development of the infarction, involved a photo-shoot positioning task that appears to have been the cause of her dissection(s). She developed neck pain immediately following the photo-shoot and sought care for the neck pain from a chiropractor. In October 2016, the Los Angeles County Coroner’s released a report on the death of Ms. May. The report noted that “The cause of death is due to infarction of the brain due to vertebral artery dissection due to blunt force injury of the neck” the report continued “… for which she sought treatment at Back to Health Wellness Center.”

The passing of Ms. Katie May was a tragic event. It’s an important clinical incident from which we need to learn as much as we can. We begin this discussion by offering our greatest and deepest sympathies to the family of Katie May and to her friends on her untimely passing.

We need to explore these circumstances from six different vantage points including:

1. What has been reported in the press.

2. What we think we know about the situation at this point.

3. What is yet to be learned in this case as evidence evolves.

4. How do the details of this case as we understand them, square with the evidence that’s been published to date.

5. What can we learn from this experience.

6. What you can do differently considering the information brought forward.

**1. What has been reported in the press?**

For those that have followed this case since its earliest days in January and February of this year, you know that there were reports that Ms. May had fallen during a photo shoot and had a rather severe injury to her neck. These reports were later disputed and it has been asserted by family and friends that this was not the case. However, there was a photo shoot. During the photo shoot, Ms. May was requested to hold a pose that caused her to be in a position with her back arched and her neck turned to the side for an extended time. Immediately after this activity, she experienced neck pain. She went on to report in social media that she thought she had a “pinched nerve” following the photo shoot.

It was also reported in the popular press in February and March that Ms. May sought care from an emergency room for the neck pain and discomfort she experienced following the photo shoot. We now know that this was not the case. To the best of our knowledge Ms. May did not attend to an emergency room in January or February of this year for her neck pain. We do know that she attended to a chiropractor on January 27, 29, and February 1. We are not sure if she attended to any other providers along the way.

The most thorough discussion of the circumstances of Ms. May and her neck pain we have found to date was published on October 23 by the Pittsburgh Post-Gazette. In this presentation, the reporter referenced that Ms. May experienced a high-velocity low-amplitude adjustment, a low-velocity low-amplitude manipulation and mechanical traction when she visited the chiropractor in late January and early February of this year. It was also reported, in the Post-Gazette, that 8 hours after she was seen by the chiropractor on February 1 that she began to feel progressively worse and she developed dizziness and headache, numbness and eventually slurred speech.

With the availability of the autopsy report that was dictated on February 5, 2016 and signed on October 21, 2016 we now have further insight into the circumstances of Ms. May following her presentation to the Cedars Sinai Hospital Emergency Room in Los Angeles. At that time a CT showed no signs of hemorrhage and a CTA “showed bilateral vertebral artery dissections and left vertebral artery and basilar artery occlusion with stroke.” Tissue plasminogen activator (tPA) was administered. The tPA didn’t work and the clot busting drug did not have the effect that it was hoped to have. Attempts were made to perform a thrombectomy on the left vertebral artery and it was reported some clot was retrieved. Ms. May’s condition worsened and she ultimately succumbed to the brain infarction and was pronounced dead on February 4, 2016.

**2. What do we know about the situation at this point?**

The “SUMMARY OF EVENTS” stated in the autopsy report noted: “A CT scan revealed bilateral vertebral artery dissections, which occurred after chiropractic manipulation.” This stands in contrast to the opinions expressed by neurologists reflecting on this case that saw the origin of the dissection being the position she was asked to hold during the photoshoot.

The Coroner determined the vertebral artery dissection yielding the infarction to be due to “blunt force injury of neck.” The report goes on to note in the following sentence “Initial reports are of an injury of the neck [pose held during photo-shoot] resulting in neck pain for which she sought treatment…” A careful review of these writings can lead to several different conclusions, one of which is the “blunt force injury of the neck” preceded the care rendered by the chiropractor another could take it to mean the care of the chiropractor was the “blunt force injury of the neck.” Anyone familiar with manual cervical spinal adjusting procedures would find it hard to equate the forces of that procedure with “blunt force injury.” The literature on the stresses placed on a vertebral artery during the processes of an adjustment indicate that the forces involved fall well below the levels needed to injure a healthy vertebral artery.

The autopsy report of October 21, 2016 has caused questions, thought to have been answered, to resurface. The autopsy report notes a series of contusions on the body. Several of these are most likely associated with the presence of IV lines and other procedures performed on Ms. May in the emergency room. Of particular interest is the report of “a purple contusion to the left upper arm and the distal left upper arm near the antecubital fossa. A yellow to green contusion is noted to the left upper chest.” These findings would be consistent with a fall as first reported and later denied. When compared with the Coroner’s illustration accompanying the written report suspicion increases.

The Coroner indicated that he relied on a 2007 case report to base his opinion that “bilateral vertebral artery dissection is a rare complication of neck manipulation reported in one per 100,000 to one in 2 million manipulations.” The specific reference made by the Coroner is interesting as is the comment made by the Coroner about the literature he cited. The 2007 case report by Andres Leon-Sanchez, M.D. did not develop findings of a vertebral artery dissection on imaging or on autopsy. On autopsy, in this case report, the vertebral artery was noted to be thrombosed but there was no discussion of dissection of the artery. Further, the Coroner grossly misstated the occurrence rates of bilateral vertebral artery dissection associated with chiropractic care. There is NO literature that supports a rate of occurrence of bilateral vertebral artery dissection associated with chiropractic care as he indicated. Finally, the decision by the Coroner to rely on one of the lowest forms of evidence, a case report, while overlooking case-control studies, case-crossover studies and a meta-analysis all known to be far more useful in terms of the power behind their findings than a single case report, is puzzling.

**3. What is yet to be learned in this case as evidence evolves?**

Importantly, we do not know how Ms. May presented for care on January 27. We don’t know what symptoms she presented with. We don’t know how they changed over the ensuing days.

We don’t know what was done by the chiropractor to assess Ms. May when she presented for care. We are at a very significant disadvantage in understanding this in relationship to the chiropractic interface. We also don’t know what care was provided to Ms. May. We understand what the reporter wrote on October 23 of high-velocity low-amplitude, low-velocity low-amplitude manipulation and mechanical traction but we don’t know the details of the care provided. We don’t know what type of adjustments Ms. May was given nor do we know what type of traction procedures were used. We don’t know how she responded to care each day as she went through this sequence of 3 visits.

We don’t know if she presented with any signs or symptoms that the chiropractor, or any clinician, should have provided a response. This could have been a very straightforward presentation as mechanical neck pain with no signs of neurological complications. We also don’t know if a referral was indicated or if the chiropractor made any recommendations to Ms. May about what she should do in response to her circumstances such as a referral for additional studies or care.

Also, we don’t know if Ms. May was offered an informed consent to care prior to the time that she received chiropractic care and if the informed consent offered details of any possible association between vertebral artery dissection and chiropractic care. We do know one thing that did come out from the Coroner himself-a statement saying he has never seen a case of this type in his career.

For this to be the first time that he saw something of this nature in his career means it is, as we well know, unique. It also causes us to question if the Coroner had an adequate appreciation for the nuance nature of this problem and was he aware of the literature associated with it.

**4. How do the details of this case as we understand them, square with the evidence that’s been published to date?**

This case is very consistent with the published scientific literature regarding vertebral artery dissection and appears to fit the scenario of a dissection in progress perfectly. The neck pain the patient presented with on January 27 was likely a sign of the dissection underway when she presented for care.

The current thinking in these cases is as follows: the patient dissects, the dissection produces neck pain and headache, the patient seeks care for the neck pain and headache and they go on to develop emboli and stroke at essentially the same rate whether they attend to a chiropractor or to a medical doctor. This is very critical to us fully appreciating and understanding this discussion.

The research that was generated by Dr. David Cassidy et al. in 2008 was based on findings from the population of the province of Ontario, Canada over a 9-year period generating approximately 110 million person/years of data. These data were evaluated for the presence of clinical information related to cervical artery dissection.

What Cassidy found was that when people dissect they commonly develop neck pain and headache and they seek care for their pain. Whether they seek care from a chiropractor or they seek care from a medical doctor, they go on to stroke at essentially the same rate. It is logical for us to assume that the medical doctors of Ontario were not providing cervical adjustments and the chiropractors involved in the care were providing cervical adjustments. Using this assumption, if there is no increase in risk, beyond the background risk, associated with medical care seen among the patients under chiropractic care, then it’s logical to conclude that what the chiropractor is doing in his or her office is not contributing to this problem. This same line of reasoning was replicated in 2015 by Kosloff and Elton using similar criteria among Medicare and commercially insured persons in the U.S. The 2015 study resulted in a data pool equivalent to 5% of the population of the U.S. and developed findings consistent with and reinforcing the findings of Cassidy et al. from 2008.

The questions that remain at this point are first, was it possible for the chiropractor to recognize an evolving dissection in progress? and second, if so, did the chiropractor fail to recognize an evolving dissection? Ms. May could have presented in a very benign manner showing no signs suggestive of dissection other than neck pain. The next question then becomes, if she was a dissection-in-progress patient, did the care of the chiropractor worsen the evolving dissection that the patient presented with?

An intriguing question for us as chiropractors looking at this matter is had Ms. May never sought care from a chiropractor, had she gone to Starbucks instead of the chiropractor, or had she gone to a medical doctor or the movies, would she have had the same fate in the final analysis? We don’t know that. We need to be candid in evaluating the facts of this case as they emerge and learn as much as we can about this situation.

**5. What can we learn from this experience?**

First and foremost, as much as we see neck pain day in and day out and it becomes a normal routine for us, we need to continue to be alert to the possibility of dissection in progress.

The most common symptom presentation of a dissection in progress is neck pain and headache. We want to be alert to neck pain and headache that has an unusual origin or unusual character to it. When this presents, you want to explore the symptoms of neck pain and headache with those patients as fully as possible. You want to learn as much as possible about the type of pain they’re having, the presentation of the pain, the history of it, how long they had the pain, where it came from, how it started. You want to look for unique characteristics in terms of the pain and its intensity.

Patients who experience cervical artery dissection commonly speak of pain that is “unlike any neck pain (or headache) I have ever had before.” Comments expressing thoughts of this nature are important for all clinicians to consider carefully. Among patients that experience neck pain and headache the pain involved is usually consistent from episode to episode. A chiropractor will often hear from a patient “I had one of my headaches last night,” or something to this effect. They know their pain. When they express a totally unique pain or an extreme departure in the degree of the pain this could be an indicator of a different mechanism of origin of the pain—such as an arterial dissection.

Another opportunity for us to learn from this critical incident involves social, clinical value and legal value of informed consent procedures and documentation. You can make the argument that if there is no greater risk for vertebral artery dissection under chiropractic care in comparison to medical care for persons with neck pain and headache, how can we develop an informed consent? The question is also asked if there is the need for the chiropractor to provide informed consent in patients with neck pain and headache, is the same required of their primary care physician?

There is an association, whether it’s temporal or statistical, between chiropractic care and vertebral artery dissection. There is also the same association between medical care and vertebral artery dissection. Association is not causation. The most recent literature from early 2016 (Church et al.) found (as did Cassidy and Kosloff) no convincing evidence of a causal relationship between chiropractic care and arterial dissection. Nonetheless, in the process of informed consent one seeks to err on the side of caution and to discuss associations for the patient to be fully informed. Important in the process of informed consent is the delivery of the information.

Informed consent is not a slip of paper signed at the front desk and put into a file and that’s it. The patient should always have an opportunity to discuss with you any questions or concerns that they might have. Not with the front desk but with you. The delivery or presentation of informed consent is very important in the totality of process.

The third step in the process is to make sure your records reflect the informed consent discussion. The elements include: the documentation was presented to the patient, the patient signed it, you discussed it with them, they did or didn’t have any questions, you sign it, date it and move on. Obviously, maintain a copy of informed consent signed by the patient in the patient records. Over time update your informed consent as the literature evolves. If you don’t know where to go to get a good informed consent statement or information about the best practices associated with this process consult with your state association legal counsel or your state board of chiropractic examiners to assure that you are complying with your state laws and regulations.

ChiroSecure has developed a very useful informed consent packet that not only provides you with an informed consent statement for your consideration but also provides you with the background literature in summary form to be able to fully understand and appreciate the nuances of the informed consent and to be able to explain to patients the information. Continuing with the theme of what we can learn from this experience, this is a great opportunity to review the current literature on this subject: Cassidy, 2008, Kosloff and Elton, 2015, and Church and associates, 2016.

Cassidy was the seminal article establishing the idea that there was no greater risk of vertebral dissection under chiropractic care in comparison to medical care for patients presenting with neck pain and headache. Kosloff was a repeat of the Cassidy model using US data in a much larger pool and came up with even stronger results. Church published in 2016, and it is very interesting because it comes from a team of neurosurgeons at the Penn State Institute of the Neurosciences. They concluded that there is no causal relationship between cervical spine adjusting and vertebral artery dissection.

**6. What can you do differently considering the information brought forward in this case?**

When a patient presents with headache and neck pain, investigate it more fully, then tease out and explore how the patient is describing the pain. When they use a phrase, something like or close to, “this pain is unlike anything I’ve ever had in my life,” or “this is unlike any kind of neck pain I’ve ever had before,” or “it’s the worst neck pain I’ve ever had before,” pay very close attention. When they come in and talk about it being unlike anything they’ve ever had before, keep in mind they don’t routinely dissect their arteries. When they do dissect an artery, it produces a unique pain that they very rarely experience.

The second bit of information from the patient’s history to keep an eye on is a family history of aneurysm or dissection. If there is a history of aneurysm or dissection, there’s a 5% likelihood that that person may be moving in the direction of aneurysm or dissection themselves.

Another consideration from the patient history relates to collagen disorders that lend themselves to dissection. For example, Marfan’s disease. Marfan’s disease is most commonly associated with dissection of the abdominal aorta but can involve the vertebral arteries. Osteogenesis imperfecta 1 increases the fragility in arteries. Ehler-Danlos syndrome III and VI also demonstrate increased likelihood of dissection. Fibromuscular degeneration increases arterial fragility. Fibromuscular degeneration has

the tendency to appear more in the renal arteries than the vertebral arteries but it sets the stage for dissection in any artery of the body. We also want to pay attention to clotting disorders. Patients with hypercoagulable states have a greater risk of thrombi/emboli formation than the normal population.

Relative to physical examination, we were all taught George’s test in school. This test has too many false positive and too many false negatives. It is essentially of no useful clinical value. In contrast, take the opportunity to listen for bruits at the base of the neck. If you hear a bruit, consider a referral immediately. If you don’t hear a bruit, that’s good, but it doesn’t mean everything’s free and clear. Continue to look at what’s going on. Be on the lookout for neurological changes in general, and neurological changes with cervical motion, whether that’s active motion or passive motion.

What changes should you be looking for? You want to look for the 5Ds, the 3Ns and the A. Dizziness, diplopia, dysphagia, dysarthria, drop attacks, nausea, numbness, nystagmus and ataxia. If we take every person that sees a chiropractor because they have a degree of dizziness and refer them, we would be filling every MRI facility in the country 10 times over! That’s not what we need to do. When you think about things like dizziness, nausea or numbness, they are less of a concern individually. We need to think about how they cluster.

When patients present with double vision, difficulty swallowing, or difficulty speaking, these are major stroke signs. We want to pay very close attention to them. Nystagmus is another symptom that we want to move up the scale of suspicion. Be aware of all 9 of these symptom categories. Some are relatively urgent. Others not so, but think about the constellation and the development of the pattern that these symptoms represent.

If you suspect the possibility of a dissection in progress, referral should be pursued. The urgency of the referral and the endpoint of the referral—a neurologist’s office or an emergency room — will be dictated by the circumstance of the patient. If a patient rejects your recommendation for referral, document the conversation, note your recommendation and the patient’s refusal to go along with your counsel. If the patient is accompanied by anyone, note the rejection of your advice to the patient to them as well.

The death of Ms. Katie May was most unfortunate and untimely. We can’t change anything about those circumstances. We can, and we must, learn as much as we can from this exceedingly rare event and to be keenly aware of a similar event in our offices. Additionally, this background information will enable you to better address the concerns and questions of our patients and the population in general.

Let’s look at the basic numbers related to vertebral artery dissection. The natural history of vertebral artery dissection is approximately 1 case per 100,000 per year. This is an estimate of the occurrence of this phenomenon in the population and is not related to the presence or absence of any form of health care. If we assume in the United States we have a population of 350 million people and this occurs at a rate of 1 per 100,000, that means on an annual basis in the U.S., there will be 3,500 vertebral artery dissection cases.

If we assume that chiropractors see about 10% of the population, then that means 10% of 3500 or 350 of these phenomena will likely cross paths with a chiropractor. (This assumes a perfectly even distribution across the population and a perfect distribution among the chiropractic community. We know that’s not real but as an illustration, let’s use this data.)

We know from the literature that the fatality rate with vertebral artery dissection is approximately 5%, again this is the natural history of this condition. Five percent of 350 is 17-18 cases. This suggests that 17 or 18 cases of vertebral artery dissection will cross paths with the chiropractic profession annually—not be caused by them but present as dissections in process that will have a fatal outcome. This also suggests that 332-333 fatal cases per year will cross the paths of medical providers. Remember, this is the natural history of this condition. This is NOT data derived under chiropractic care, this is simply how the condition presents in the population.