Spinal Cord Injury

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The way that the spinal column is developed in the human body is designed to protect the spinal cord for maximum protection and functionality. The spinal cord is a major part of the Central Nervous System and is responsible for relaying information to and from the brain and every organ and extremity of the body. With such a large functional responsibility, any disruption in functioning can create a wide variety of issues and health problems. This research is aimed at informing the reader of some of the potential consequences of injuring the spinal cord, ways in which these injuries can occur and develop, along with some of the ideas in treatment surrounding the matter of spinal cord injuries.

With spinal cord injuries, they are the most common and recognized occurrences in people with paralysis. However, there are many other medical issues and conditions that can develop with a spinal cord injury, or as a result of one, depending on where the spinal cord is injured or affected. There are various degrees to the extent of spinal cord injuries, along with the fact these injuries can occur in a multitude of ways, "Motor vehicle crashes (MVCs) rank first followed by acts of violence (primarily gunshot wounds, or GSWs), falls, and recreational sporting activities" (Khan, Waheed, & Ahmed, 2016). In either of the manners indicated, when the spinal cord is damaged in the course of events, some areas and/or functions of the body becomes affected. As reported by Khan et al. (2016), "Spinal cord injury is an insult to the spinal cord resulting physical and functional deficits such as paralysis, bladder incontinence and sexual dysfunction. Spinal cord injuries can lead to a cluster of signs and symptoms. Its clinical features are influenced by the level at which it is damaged" (Khan et al., 2016). This makes clear the wide range of issues that can arise as result any kind of injury to the spinal cord, with either

injury having the probability of leading to other health complications that can impact the quality of life for injured person.

One of the lesser known issues that are associated with spinal cord injury is lower urinary tract complications. This is particularly problematic because improper management of the lower urinary tract will eventually result in kidney, and ureteral complication. This happens because the functions of the lower urinary tract are sometimes lost after a spinal cord injury; again, depending on the extent of spinal cord damage. A study by van Wijk reports that, “The kidneys and ureters are important in the homeostasis of the body. While it is important to prevent damage to the upper tracts, kidney damage in the SCI [Spinal Cord Injury] patient is mostly caused by dysfunction of the LUT [Lower Urinary Tract]. Management is therefore concentrated on the LUT” (van Wijk, 2012). This focus in treatment is closely related to the idea that the urinary tract is gateway to other health complications.

Furthermore, van Wijk (2012) reports that, “The level and extent of the SCI are not always exact. The injury to the spinal cord may be complete or incomplete and may be over a longer segment than only the level of injury. It is therefore important to correlate the injury with the clinical picture and the urodynamic findings.” (van Wijk, 2012). This signifies the importance of determining the extent and effects of a spinal cord injury to minimize further health issues, as well as further aggravation of the spinal injury. This approach is also the foundation of what medical treatment will be best for the individual.

Along with lower urinary tract complications, there is also the matter of urinary tract infection which can lead to pyelonephritis; an inflammation of the kidneys as a result of bacterial infection. It is reported by Leoni, & De Ruz, (2003), “That people with SCI have an increased risk of developing urinary tract infection (UTI)” (Leoni, & De Ruz (2003). In contrast to the

early 1900s, today, only a small percentage spinal cord injury patients die as result of urinary tract infections, whereas most of them died in the 1900s (Leoni, & De Ruz (2003). This further emphasizes one of the complications associated with the urinary tract as a result of a spinal cord injury. These complications occur as a result of muscles in the bladder losing their ability to function properly, causing the bladder to lose its ability to regulate the flow of urine. van Wijk (2012) states, "The normal bladder has storage and emptying functions. The detrusor in SCI patients may be overactive, non-compliant or underactive, depending on the level of injury and the patient's response to the denervation" (van Wijk, 2012). What this indicates is that the muscles in the bladder are responsible for holding urine in, and letting urine out, and when the detrusor muscles are affected as a result of a spinal cord injury, bladder control functions are compromised. However, there have been some advances in medical treatment for this issue, one of which is botox injection.

However, van Wijk (2012) indicates, "The main treatment is to lower detrusor contraction to reduce the risk of complications and create a safe storage organ for the urine. To achieve this, anticholinergic medication is used. Currently intravesical botulinum toxin (Botox) is widely being used owing to its efficacy and low side-effect profile" (van Wijk, 2012). Other forms of treatment are available such as anticholinergic treatment which involves medication that will allow the bladder to better function as it is intended.

Another issue associated with spinal cord injuries is one that particularly affects men; erectile dysfunction. Erectile dysfunction can be caused by other reasons that are not directly or physically related to the functional anatomy of a male; however, spinal cord injury is something that is commonly known to be associated with erectile dysfunction in men depending on where

the spinal injury has occurred, as different areas of the spinal cord affect different areas of the body. Ramos, & Samsó (2004) indicate that;

> "Most cases of ED result when the lesion destroys the T11-L2 segments. Nevertheless, depending on the extent of the lesion and the level of the segments affected, reflexogenic and/or psychogenic erections may still occur. When the lesion is located in the lumbosacral segments (L3-S5), the sympathetic center can receive central stimuli and the patient can achieve psychogenic erections. However, these erections are often less rigid and more difficult to maintain" (Ramos, & Samsó, 2004).

While there is very little data to support erectile dysfunction being physically harmful, the conditions created by spinal cord injury can produce some very adverse effects in men with spinal cord injuries. Ramos, & Samsó,(2004) argue, "In men, it causes a serious alteration of the physical phenomena that controls sexual activity, such as erection, ejaculation, and perception of orgasm, and changes the sexual behavior of the patient. These alterations are often accompanied by a personality disorder, manifesting as decreased self-image, low self-esteem, feelings of distrust, and fear of abandonment (Ramos, & Samsó, 2004). It becomes especially understandable; the importance of addressing any matters of impotence with men affected by spinal cord injuries, and emphasizes magnitude of emotional and psychological matters that can result from issues associated with spinal cord injuries, and why they are just as important to be addressed as the lower urinary tract, and the spinal injury itself.

There are several forms of treatment for erectile dysfunction in men with spinal cord injuries which should be considered based on level of spinal injury, emotional, psychological, physiological need. In most cases, counseling is always recommended for the purposes of

understanding, as indicated by Ramos, & Samsó, (2004),"how his SCI will affect his sexual response, not only the specific problem of ED but also overall perception of orgasm" [...] "on how to find pleasure in erogenous zones unaffected by the SCI, such as the neck and back, so that he can achieve orgasm-like sensations" (Ramos, & Samsó, 2004). It can be concluded that injuries of the spinal cord impact far more than just nerves, muscles, and mobility. Emotional functioning can be impacted as well.

In some cases, oral medications are sufficient to address issues of erectile dysfunction as indicated by (Ramos, & Samsó, 2004), "Sildenafil citrate has shown high efficacy and safety in the treatment of ED in patients with SCI. Clinical studies have shown efficacy rates of 75–94% in this population compared with 7–10% for placebo-treated patients" (Ramos & Samsó, 2004). Other forms of treatment include the injection of vasoactive drugs directly into the penis to induce an erection for copulation. Ramos, & Samsó, (2004) state, " In published studies, intracavernous injections have been shown to have high efficacy rates, ranging from 80 to 90% in patients with SCI and reflex erections and 70 to 80% in those with [a reflexive] erections. Few complications have been observed and their management is relatively easy." (Ramos, & Samsó, 2004). Lastly, in matters of erectile dysfunction related to spinal cord injury, in some circumstances where the other options are not effective, there is the consideration of surgery in which Ramos, & Samsó, (2004) confirm, "Only cases in which the previous treatments have proven ineffective should other treatment options, including surgical procedures (penile prosthesis and sacral root stimulation) performed by specialists in urology or andrology, be proposed" (Ramos, & Samsó, 2004).

Finally, there is the most common condition associated with spinal cord injuries, and that is paralysis. In reference to the lower body, paralysis can either be full (complete), or partial

(incomplete). According to Desert, J. (2008-2016), “Paraplegia is the paralysis of both lower limbs resulting (with exceptions) from a spinal cord injury, most often the result of some sort of trauma caused by accidents, but sometimes due to medical conditions (illness)” (Desert, 2008-2016). With partial paraplegia, there is some feeling, and muscle movement, but is not controllable in a conventional sense. Partial paralysis is exactly as it states; partial. Which indicates that there may be some level of feeling and/or movement, just not in a functional capacity. As supported by Partial Paralysis- Brain and Spinal Cord,(2016) , “Partial paralysis is characterized by some movement or sensation in affected muscles or muscle groups. While the function of a muscle or a group of muscles is affected to some degree, there is not a total loss of function. In partial paralysis, the patient can often move one limb more than another, may have more function on one side than the other, or might have some sensation in parts of the body that can’t be moved” (Partial Paralysis - Brain and Spinal Cord, 2016).

As with the other issues associated with spinal cord injuries, the level of severity will be the biggest determinant in the amount of feeling and movement a spinal cord injury patient will exhibit. Therapy and treatment will sometimes play a role in feeling, and mobility improvement; however, it is the severity and the location of the injury on the spinal cord that will have the biggest impact on feeling and movement. In a lot of cases, paralysis is not curable (Morrison, W. A., MD. 2016, July 5); however, treatment approaches vary depending on extent of injury. For paraplegics, the initial goal is to try and regain as much function as possible, while the long term treatment goals will address living with the disability, quality life, and avoidance of further complications (Partial Paralysis - Brain and Spinal Cord, 2016).

In regards to partial paraplegics, the approach to treatment will largely depend on the cause of injury to the spinal cord. Partial Paralysis-Brain and Spinal Cord, (2016), state that

treatment will generally consist of; “physical therapy, occupational therapy, surgery, prescription medications, or a combination of the above. Treatment is designed to return as much function as possible to the patient, while also helping him or her learn to cope with any long-term disabilities” (Partial Paralysis - Brain and Spinal Cord. (2016). It should be understood that coping with long term disability will require a lifetime of adjustments as physical capabilities diminish over time, and creating more need for treatment.

In closing, full or partial paralysis is a very serious medical condition, and the preceding research highlights the implications of what it means to become the subject of a spinal cord injury in the most basic sense. UTIs, impotence, and paralysis are all serious medical issues independently; however, together they can be catastrophic. It is the author’s hope that the above research has fulfilled its intentions of giving the reader a basic, but informed idea of what it means to be paralyzed, and the often sequential complications that arise as result of this extremely debilitating condition.

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