

## Literature Review

# Comparison of Duration of Ketoacidosis in Sodium-Glucose Transport-2 inhibitor (SGLT2i) users and non-users among Individuals with Type 2 Diabetes: Case series

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## Introduction

The aspects that affect the well-being of patients after neurosurgery are diverse. While most contemporary research argues that well-being is multidimensional and related to how individuals, communities, and societies feel when they are successful, there is no single agreed-upon definition (Dodge, Daly, Huyton, & Sanders, 2012). Well-being is a term used synonymously with a wide range of concepts including self-esteem, self-efficacy, self-determination, resilience, quality of life, improved mood, positive mental health, life satisfaction and value (Huppert, 2017).

A patient after neurosurgery experiences a hospitalization that can affect his well-being and he eventually returns to the community from which he came. A community is a small, local group of people who share common interests and values (Aggarwal, 2023). When patients return after neurosurgery to a society that should help them reintegrate while dealing with new physical and mental disabilities, this requires cooperation and can reflect the level of social cohesion, which may be affected by the resilience of the community.

A resilient community is a community that can help its members withstand and recover from general or personal adversity and crises, respond to individuals in times of crisis and provide them with strong social networks. The strength of each individual in society ultimately contributes to the strength of society as a whole. If so, the aspects that affect people's well-being are many and one of them is a stable and strong community. And what about the patients' well-being after neurosurgery? How can we ensure that they become a significant part of society again and not a burden?

This report will deal with a specific aspect that may contribute to their well-being at different levels and that is sex. The goal is to systematically review the literature investigating sexual relations after neurosurgery and offer recommendations for dealing with patients after neurosurgery since there is not much literature on the subject but there is a great need for essential information on this subject, both on the part of the therapists and the patients.

## Literature Review

Emotional intimacy, sexual satisfaction, and relationship satisfaction are closely intertwined for couples and can play a significant role in the dynamics of their relationship [7]. A study that explored the relationship between sex and personal well-being found that abstinence was particularly related to maintaining relationships over time. Perceptions of a partner's motivations for sex were also related to well-being [5].

When the relationship between well-being and self-satisfaction with sexual function in women was investigated, a group of 349 women aged 18 to 65 were recruited from the community. Women who identify themselves as having sexual dissatisfaction have a lower general psychological well-being. These findings reinforce the importance of addressing sexual health and sexual well-being in women as an essential component of their health care [12].

In the English Longitudinal Study of Aging (ELSA) a total of 6,201 core participants aged 50 to >90 completed a comprehensive questionnaire. While the likelihood of reporting sexual health concerns tended to decrease with age in women, the

opposite was seen in men. Poor sexual function and disagreements with a partner about initiating and/or feeling obligated to have sex were associated with general sex life dissatisfaction in men. Sexually active men reported higher levels of concern for their sexual health and well-being than women of all ages. The conclusion is that sexual health must be managed not only in the context of age, gender, and general health, but also within the framework of the existing sexual relationship between partners due to the impact on their well-being [8].

The physical demands of intercourse were reviewed in original studies published in PubMed, Scopus, and Web of Science through April 2020. 18 studies analyzed physical demands during intercourse. It was found that sexual intercourse can induce an energy expenditure of ~100 kcal and an average heart rate between ~90 and ~130 beats per minute. However, the physical demands may vary depending on the health status, position, duration of the activity, stage of the relationship and differences between the sexes [6].

Intercourse may elicit moderate physical demands, but the demands vary according to contextual variables. Also, not only studies that combine physiological and kinematic analyzes are necessary, but also quality studies should be published to better understand the physical demands of sexual intercourse, thus increasing the ability to guide patients after medical procedures when they back to their home [6].

The impact of different types of neurosurgeries on sexual health and activity after surgery is a common question among patients and health care professionals. There are recommendations from neurosurgeons, but there is no clear answer to this question in scientific literature and there is no blanket clinical agreement. Sexuality is an essential aspect of quality of life. However, intercourse is physically challenging and leads to obvious changes in blood pressure, heart rate and breathing rate that can lead to vital complications [4].

## Discussion

If so, is it allowed? Is it safe after neurosurgery? And if so, when is it allowed to start?

And how much is allowed? and how? Many neurosurgical patients are young, fit and lead sexually active lifestyles. Moreover, some of them suffered a cerebral hemorrhage while having sex and many questions arise regarding the return to routine after weeks and months of hospitalization and rehabilitation. There is a paucity of evidence in the literature to suggest when or if intercourse can be considered safe after neurosurgery. How often do we encounter sexual complications after neurosurgery? Do we have a safe "honeymoon period" for resuming sex?

How soon after hospitalization is it safe to have sex? Do the patients doubt this possibility and fear? [1].

This report will attempt to answer these important questions. The goal is to offer guidance to patients and their primary caregivers. To simplify things, we will classify the patients in neurosurgery into four groups: those who underwent brain surgery, those who underwent spinal surgery, those who suffered from subarachnoid hemorrhage, and those who underwent traumatic brain injury.

### Brain Surgery

After brain surgery, the fear is that having sex will raise the Intracranial Pressure (ICP), causing a reduction in brain perfu-

sion. Such a drop can lead to a stroke, seizure, or even a Cerebrospinal Fluid (CSF) leak. During intercourse, mean arterial pressure increases to adequately meet the brain's demand for oxygen. A study that examined the increase ICP in patients who performed exercises for 20 minutes, showed that there was no effect on patients' ICP. Can we equate physical activity with sex? [11].

Besides the arterial pressure in the brain, there is an increase in intra-abdominal pressure due to the contractions of the abdominal wall and due to the weight of the partner in the "missionary" position. This increase leads to an increase in intracranial pressure and therefore to a decrease in cerebral perfusion pressure. In a study that assessed the safety of physical therapy by investigating its effect on Intracranial Pressure (ICP) and cerebral perfusion pressure, 65 patients were examined in a neurosurgical intensive care unit. The researchers concluded that physical therapy can be used safely in patients with normal or elevated ICP provided that Valsalva-like maneuvers are avoided [2].

Orgasm as a result of returning to sexual activity may indeed cause an increase in ICP, although a flood of catecholamines including dopamine during orgasm should provide an analgesic benefit, working synergistically with pain relievers that the patient may be taking after surgery. A reduction in the requirement of opioid analgesics can benefit the patient's recovery, and reduce opioid side effects such as constipation, nausea, and confusion. No research has been found to date that has examined how orgasm affects ICP. For ethical reasons, it may be difficult to conduct research in these groups to substantiate the findings [1].

### Spine Surgery

In spine surgery, there are different types of surgery, but most of them have the same restrictions. The guidance of course varies depending on the type of surgery, but there is very little guidance for patients regarding how long they should abstain from sex after spine surgery. An example of lumbar disc prolapses and microdiscectomy is used. In the context of a microdiscectomy/lumbar laminectomy, a patient discharged after surgery will be concerned about resuming intercourse for several reasons. There is a risk of recurrent disc prolapse because intercourse can increase the pressure on the lumbar spine due to the proximity to the pelvis, having intercourse too early may accelerate complications such as delay in spinal fusion or displacement of an implant. All these together and the fear of pain limit the resumption of sexual activity [10].

In a survey that included 50 spine surgeons: 47 men and 3 women with an average age of 45.7 years, the participants were asked questions about the number of weeks it is recommended to abstain before returning to sexual activity after minor, medium and major spinal surgeries. It was found that there were no statistically significant correlations between the ages or years of the participants. Some answers differed significantly between participants. The results also showed a trend for spine surgeons to recommend longer intervals for returning to sexual activity after more involved surgical procedures. The results of the survey demonstrate the complete lack of doctor's agreement regarding recommendations for returning to sexual activity after surgery and the need for further research [3].

Despite the high prevalence of sexual dysfunction in spine patients, counseling about sexual health is not often done in

neurosurgical care. Members of the Dutch Association for Neurosurgery were sent a questionnaire regarding their attitudes, knowledge, and practice patterns regarding sexual health discussion to identify knowledge, attitude and practice patterns of neurosurgeons who advise their patients about sexual health, because it is not known to what extent neurosurgeons discuss this topic with their patients [14].

Most participants (83%) were male; Average age, 42.4 years. The average experience in neurosurgical practice was 9 years. The respondents assumed that in 34% of their patients, sexual health was compromised due to spinal disease. Most of the respondents (64%) stated that the responsibility for discussing sexual health lies (partially) with the neurosurgeon; However, 73% indicated (almost) never doing so. The main reasons for not discussing sexual health were the patients' age (42%), lack of knowledge (38%) and patients' lack of initiative to raise the issue (36%). 26 percent cited lack of time as a reason. There was no evidence of physician gender or age mismatch as important barriers. 50 percent of participants wanted to gain more knowledge about discussing sexual health with patients [14].

Additional training in sexual health counseling at the beginning of the residency program seems critical. Neurosurgeons have the potential to identify sexual dysfunction and make appropriate referrals when needed, thereby improving the overall well-being of their patients as they return to the community they left and take their steps back to normalcy [14]. As part of the rehabilitation treatment after spinal surgeries, pushing or tilting exercises of the pelvis are performed which are usually used to improve lumbar stability. The thrust involved in intercourse may provide a valuable benefit to the patients' physical therapy provided the movement is not too forceful [1].

### Subarachnoid Hemorrhage

Sexual intercourse may also be a trigger for subarachnoid hemorrhage with fatal outcome, as shown in a case report of a 22-year-old woman who suffered subarachnoid hemorrhage after intercourse. The patient was immediately transported to the hospital by emergency medical services but died within 24 hours. After postcoital headaches, subarachnoid hemorrhage is the second most common cause of neurological complications of intercourse.

Nevertheless, more studies are needed to prove a direct link between sexual contact and cerebral aneurysm rupture [4].

To assess the consequences of aneurysmal subarachnoid hemorrhage (aSAH) on sexual pleasure in patients, anonymous, standardized questionnaires concerning sexual function were administered, including the International Index of Erectile Function (IIEF), the Female Sexual Function Index (FSFI), and a statement of subjective change in sexual pleasure. After aSAH. 33 patients participated in the study, all of whom had positive neurological outcomes (score 4 or 5 on the Glasgow Outcome Scale). The results showed that 10 patients (31.3%) reported subjective worsening of sexual pleasure after aSAH. Sexual dysfunction affected 9 of the 19 patients (47.4%). All 19 women suffered from hypoactive sexual desire disorder. Erectile dysfunction was present in 7 of the 14 male patients - 50% [9].

Since this study is the first known evaluation of sexual health following aSAH with positive neurologic outcomes, and it confirms that sexual dysfunction is common in this population, it is recommended to investigate sexual health during follow-up with these patients [9].

### Traumatic Brain Injury

Another group we will refer to in this report is a group of patients with Traumatic Brain Injury (TBI). A study aimed at investigating the impact of TBI on sexual ability, activity and satisfaction and linking the findings to neurological status, functioning and well-being included 92 TBI individuals (65 men, 27 women). Their age ranges from 20-70 years. The median age at the time of injury was 32 years. The time since the injury ranges from 1-20 years (median 9 years). The participants were tested according to a procedure that includes a neurological examination, self-assessment of general health status and functioning and mood and data collection on social situations. 53 of the participants had a stable relationship with a partner at the time of the investigation [15].

This study showed that TBI generally alters sexual function and desire. Many of the respondents reported a decrease in the ability to achieve an erection, a decrease in the ability to experience orgasm, a decrease in sexual desire and a decrease in the frequency of intercourse. A high level of physical independence and preserved sexual ability were the most important predictors of sexual adjustment [15].

### Recommendations

From a theoretical point of view and considering the literature review above, the recommendations are:

- The attending neurosurgical team should be aware of this aspect of the patient's lifestyle and should be prepared to discuss it during the preoperative consultation period without any stigma in recognition of the impact of sexual intercourse on the patients' well-being. Patient information leaflets should include details about sex after neurosurgery.
- High-risk patients who have undergone major brain surgery may avoid intercourse in the post-neurosurgery period. Patients who wish to have sex despite the potential risk of seizures, stroke or CSF leak should be advised to avoid the Valsalva maneuver and be warned against any positions that involve effort, heavy lifting, or pressure on the abdomen.
- Patients should be warned after microdissectomy about the risk of intercourse in the early postoperative period. Controlled and gentle pelvic thrusting should be encouraged as part of physical rehabilitation. As a rule, if pain appears, it is recommended to avoid it. Apart from pain, there is no clear contraindication to sex after most spine surgeries and the spine neurosurgeon should be able to discuss this with the patient before surgery. This applies to various neurosurgical interventions on the spine.
- Post-cranial and spinal surgery patients may be rewarded with analgesic benefits from the endorphin response secondary to orgasm. Staff should be aware to that.
- Since it has been shown that sexual dysfunction is common in the aSAH population, it is recommended to investigate sexual health during follow-up with these patients and guide them accordingly.
- Given that many TBI individuals report physiological sexual disturbances and decreased sexual ability, it is important to inform patients about the options to optimize their sexual ability. Organized sex education programs should be an integral component of TBI rehabilitation.

- The fear regarding “sex after neurosurgery” should not be eliminated and sex should be encouraged when the patient agrees to it, with a commonsense approach [1,9,15].

### Conclusion

The aspects that affect people's well-being are many and among them is a stable and strong community that can help its members withstand and recover from general or personal hardships and crises, respond to individuals in times of crisis and provide them with strong social networks. The strength of everyone in society ultimately contributes to the strength of society until, in the end, the strength of the whole exceeds the sum of its parts.

The well-being of patients after neurosurgery is important for them to become a significant part of society again. This report dealt with a specific aspect that may contribute to their well-being at different levels and that is sex.

Investigating sexual intercourse after neurosurgery at literature reveals a lack of evidence to reliably conclude the safety of sexual contact after neurosurgery. Moreover, both doctors and patients lack information about the possibility of intercourse after neurosurgery, rehabilitation and return to the community. It is advisable to use the recommendations from the literature for dealing with patients after neurosurgery. More research is needed on this important topic that has a direct connection to the well-being of patients after neurosurgery and for some of them in the community to which they return after hospitalization.

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