Considerations for Contraception Following Spinal Cord Injury: A Systematic Review

Lauren M. Hall, MD,[1,2] Chinenye C. Nnoromele, MD,[3,4] Amber Trujillo Lalla, MD,[5,6] Claudia B. Hentschel, MD,[1,2] and Chloe Slocum, MD, MPH[1,2]

[1]Spaulding Rehabilitation Hospital, Boston, Massachusetts; [2]Department of Physical Medicine and Rehabilitation, Harvard Medical School, Boston, Massachusetts; [3]Shirley Ryan Ability Lab, Chicago, Illinois; [4]Department of Physical Medicine and Rehabilitation, Northwestern Memorial Hospital, Chicago, Illinois; [5]Department of Obstetrics and Gynecology, Massachusetts General Hospital, Boston, Massachusetts; [6]Department of Obstetrics and Gynecology, Brigham and Women's Hospital, Boston, Massachusetts

Introduction: Counseling and education on women's health, specifically contraception, following spinal cord injury (SCI) is an important component of care for women with SCI. While a plethora of available contraceptive options exists, research in this area is scarce. **Objectives:** This systematic review assesses the quality and quantity of research on contraception for individuals with SCI. **Methods:** Literature searches of three medical databases were performed to identify articles that addressed contraception and family planning for women with SCI. Articles were then screened in a two-stage selection process and evaluated for content. **Results:** Of 165 articles, 21 were identified that fit the inclusion criteria. The majority (66%) of articles were literature reviews or professional practice guidelines. Fourteen (66%) included information on short-acting hormonal oral contraception, 11 (52%) included information on long-acting reversible contraception, 15 (71%) included information on barrier methods, 6 (29%) included information on fertility awareness, 9 (43%) included information on permanent contraception, and one (5%) included information on emergency contraception. **Discussion:** This systematic review demonstrates a paucity of evidence-based information on contraception tailored to women with SCI. It highlights a need for research and comprehensive guidelines on primary and emergency contraception in this population. **Key words:** *contraception, contraceptives, family planning, spinal cord injury, women with spinal cord injury, women's health*

Introduction

Spinal cord injury (SCI) medicine is a robust field of medicine that goes beyond the neurological evaluation of a patient after they sustain SCI. After an SCI, all body systems are affected, and thus patients should be counseled and educated on these differences following injury. There have been multiple research studies that have been conducted to assess how various body systems are affected following SCI, but there are aspects of medical care following SCI that still need to be explored. One of those gaps is in the specifics of women's health following SCI.[1] More specifically, there is a relative paucity of studies focused on women's health, sexuality, and fertility following SCI.

One thought is that the lack of research geared toward women's health following SCI is due to the lower number of women with SCIs compared to men with SCIs.[2] The overall epidemiology of SCI has been consistent since the 1970s, with incidence of new traumatic injury being around 18,000 each year and overall prevalence thought to be around 300,000.[3] Of this, somewhere between 78% and 80% of these patients are male, meaning about 20% of all patients with SCIs are female. In addition, this skewed gender distribution attenuates with the extremes of age, meaning that an even smaller proportion of SCIs among female patients occur during potential childbearing years.[2,3] With these numbers, one might reasonably infer that obtaining sufficient sample sizes can pose a challenge when researching questions regarding sexuality and fertility for women with SCI.

The focus of this review is to assess the literature on contraceptive counseling in women following SCI. Based on studies to date, female fertility does not appear to be affected following SCI.[4] Acutely

Corresponding author: Chloe Slocum, MD, MPH, Harvard Medical School, 300 First Avenue, Charlestown, MA 02129; phone: 617-952-5299; chloe.slocum@mail.harvard.edu

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after injury, some women may experience a period of amenorrhea that can last up to 6 to 12 months, after which menses becomes more regular and predictable.[4] Numerous primary contraception options exist and are broadly classifiable into three tiers predicated on their effectiveness as summarized below.

The least effective methods, associated with pregnancy rates ranging from 12% to 24%, include female or male condoms, diaphragm, spermicide, vaginal gel, fertility awareness, and coitus interruptus.[5] Although less effective, these methods do not have many limitations and are readily accessible without a prescription. Condoms and diaphragm placement may require hand dexterity or placement by a partner. Women who wish to use fertility awareness to track their cycles must have regular cycles between 26 and 32 days and the ability to track their temperature appropriately.[5]

The next tier of contraceptives includes hormonal options that require regular user adherence and pregnancy rates that range from 6% to 9%. These options include progestin-only pills, the progestin-based injection known as depot-medroxyprogesterone acetate (DMPA), and combined estrogen and progestin hormonal methods in the form of birth control pills, patch, or ring.[5]

Common side effects for hormonal birth control include headache, nausea, breast tenderness, and breakthrough bleeding (**Table 1**).[5] High-dose progestins such as DMPA are also associated with weight gain and a decrease in bone density.[5,6] Pills, patch, and ring all require self-application by the person with SCI. The patch may not be as effective for individuals who are over 90 kg due to decreased systemic absorption.[7] Estrogens may also increase risk of thrombosis.[7] Contraindications for estrogen-containing birth control include hepatic adenoma, cirrhosis, breast or endometrial cancer, and risk factors for thromboembolism such as migraines with aura, history of stroke, history of thromboembolism, hypertension, less than 6 weeks postpartum, or current smokers above the age of 35 years.[7]

The third tier comprises highly efficacious birth control methods, with a less than 1% pregnancy rate. This category encompasses long-acting reversible contraception (LARC) and permanent contraception, which can be achieved with vasectomy for males and tubal ligation for females.[5] LARCs are convenient as they can remain in place for 5 to 12 years depending on the method. LARC options include copper intrauterine device (IUD), progestin-based IUD, and progestin-based arm implant. IUD insertion requires a vaginal exam with optimal positioning and is typically associated with patient discomfort. Copper IUDs may be associated with heavier and longer menses, and hormonal IUDs can be also cause irregular or breakthrough bleeding.[6]

The last category of birth control is emergency contraception, which has been reported to have a 1% to 3% pregnancy rate if used within 3 to 5 days.[5,6] Emergency contraception options include copper IUD, ulipristal acetate (selective progesterone receptor modulator), and high-dose levonorgestrel (form of progestin), and combined estrogen-progestin.[5] Levonorgestrel is available over the counter but is thought to be less effective for patients with obesity.[5] Oral emergency contraceptive pills prevent pregnancy by preventing or delaying ovulation, and the copper IUD method prevents fertilization by causing a chemical change in sperm and egg prior to fertilization.[8] Side effects for oral emergency contraception may include nausea, vomiting, fatigue, breast tenderness, and irregular vaginal bleeding.[6]

The Centers for Disease Control and Prevention (CDC) periodically updates medical eligibility criteria (MEC) for contraception, and this can be a helpful resource for providers to identify options for birth control within the context of particular medical conditions; however, SCI is not one of the conditions reported.[7] The only neurologic condition that has guidelines within the MEC is multiple sclerosis, in which the guidelines reference a theoretical risk of thromboembolism when using estrogen-containing products in patients with prolonged immobility.[7]

When prescribing any new medication, the potential risk and side effect profiles should be considered. More specifically, the risks should be weighed and evaluated with each distinct population and patient. Noting the risks discussed previously, counseling on contraception for women with SCI should take into consideration the medical conditions unique to each woman, the potential health complications associated with SCI, and the woman's personal goals and preferences. From the standpoint of contraception, these conversations can be difficult because current recommendations for contraception following SCI are based on theoretical risk. Our goal with this article is to perform a systematic review of current literature to assess the quantity and quality of research regarding contraception management and counseling in women following SCI.

Table 1. Birth control methods and considerations for women with SCI

	Method	**What is the risk for pregnancy?**	**How do you use this method?**	**How often is this used?**	**What are menstrual side effects?**	**Other possible side effects?**	**Other things to consider?**
Most effective	Female sterilization (tubal ligation)	0.5 out of 100	Surgical procedure	Once	No menstrual side effects	Pain, bleeding, risk of infection	Permanent
	Male sterilization (vasectomy)	0.15 out of 100					
	Hormonal IUD	0.2 out of 100	Placed inside uterus	Up to 7 years	Spotting, lighter or no periods	Discomfort with placement; may trigger AD; expulsion may go undetected if sensation is impaired	No estrogen; may reduce cramps
	Copper IUD	0.8 out of 100		Up to 10 years	May cause heavier, longer periods		No hormones; may cause cramps
	Implant	0.05 out of 100	Placed in upper arm	Up to 3 years	Spotting, lighter or no periods	Discomfort with placement; may trigger AD	No estrogen; may reduce cramps
Moderately effective	Injectables	4 out of 100	Shot in arm, hip, or under the skin	Every 3 months	Spotting, lighter, or no periods	May cause weight gain	No estrogen; may reduce cramps
	Pill	8 out of 100	Take by mouth	Every day at the same time	Can cause spotting for the first few months; periods may become lighter	Nausea, breast tenderness; risk for blood clots	Progestin-only pill formulations may be preferable; may improve acne; may reduce menstrual cramps; lowers ovarian and uterine cancer risk
	Patch	9 out of 100	Put on skin	Weekly			
	Ring	9 out of 100	Put in vagina	Monthly			
	Diaphragm	12 out of 100	Put in vagina with spermicide	Every time you have sex	No menstrual side effects	Allergic reaction, irritation	No hormones

(continues)

Table 1. Birth control methods and considerations for women with SCI *(cont.)*

Least effective	External condom	13 out of 100	Put over penis	Every time you have sex	No menstrual side effects	Allergic reaction, irritation	No hormones; no prescription
	Vaginal gel	14 out of 100	Put in vagina			Allergic reaction, irritation	No hormones; may require assistance to apply
	Withdrawal	20 out of 100	Pull penis out of vagina before ejaculation			No side effects	No hormones; nothing to buy
	Internal condom	21 out of 100	Put in vagina			Allergic reaction, irritation	No hormones; no prescription; may require assistance to position
	Cervical sponge	24 out of 100	Put in vagina			Allergic reaction, irritation	
	Fertility awareness-based methods	24 out of 100	Monitor fertility signs and abstain or use condoms on fertile days	Every day		No side effects	No hormones; increased awareness of fertility signs; basal body temperature tracking may be less reliable
	Spermicides	28 out of 100	Put in vagina	Every time you have sex		Allergic reaction, irritation	No hormones; no prescription; may require assistance to apply

Note: Adapted from the National Reproductive Health Training Center's "Birth Control Method Options," 2022. AD = autonomic dysreflexia; IUD = intrauterine device.

Methods

Database search

A systematic literature review was conducted to gather relevant articles and studies from PubMed, Ovid MEDLINE, and Web of Science on June 26, 2023. Primary search terms included the following: (("spinal cord injury") or ("spinal cord injuries") or (quadriplegia) or (paraplegia) or (tetraplegia)) AND (("contraception") OR ("contraceptive")

OR ("family planning") OR ("birth control")). No further search criteria restrictions were added.

Inclusion and exclusion criteria

Articles were considered if they were written in English and included information on family planning or contraception for women with SCI. Articles were excluded if they did not meet either of these criteria.

Selection process

A two-stage selection process was implemented to identify eligible articles. In the first stage, three independent reviewers screened the titles and abstracts of the retrieved articles from the search based on the criteria. Disagreements were resolved through discussion and consensus. Full text of abstracts found to meet inclusion criteria were then screened to confirm eligibility. The reviewers consisted of two SCI medicine fellows and a dually boarded physical medicine and rehabilitation (PM&R) physician who had also completed fellowship training in SCI medicine.

Analysis

Articles were evaluated for whether they were original research, a review or professional practice guideline, or case study. Articles were further assessed for whether they included information on relevant categories of contraceptive methods according to the National Reproductive Health Training Center,[9] including short-acting hormonal oral contraception, LARC, barrier methods, fertility awareness, and/or permanent contraception.

Results

A total of 165 articles were retrieved from the search criteria in PubMed, Ovid MEDLINE, and Web of Science. The reviewers agreed on inclusion of 21 articles, and a total of 144 articles were excluded. Of the 21 articles that met inclusion criteria, 7 (33%) were primary research articles, one (5%) was a case study, and the remaining 13 (62%) were literature reviews or professional practice guidelines. Of the articles included, 14 (66%) included information on short-acting hormonal oral contraception, 11 (52%) included information on LARC, 15 (71%) included information on barrier methods, 6 (29%) included information on fertility awareness, and 9 (43%) included information on permanent contraception. Only one source (5%) included information on emergency contraception.

Articles mentioned potential complications of short-acting hormonal oral contraception including concern for thromboembolic phenomena among women with reduced mobility using estrogen-containing methods,[10,11] but they noted that progestin-only oral contraceptives may be an acceptable option.[10] Several articles mentioned that reduced sensation and manual dexterity may prevent detection of expulsion for LARC such as IUDs.[10,11] Additionally, for women with SCI at or above T6, cramping after IUD placement may precipitate autonomic dysreflexia (AD).[12] Barrier methods, such as condoms, diaphragms, and spermicides, were mentioned as being potentially safer for certain women with SCI due to their lack of hormonal action and accessibility, but they have drawbacks because women with impaired hand function may need to rely on a partner or caregiver for placement and women with impaired sensation may not be able to sense whether a device is ill-fitting.[10,11] A case study also noted that for patients who require caregiver assistance for vaginal ring placement, it is relevant to consider the possibility of misplacement and to recommend training for appropriate placement.[13] Although fertility awareness was mentioned infrequently, it is important to recognize that commonly used methods of tracking fertility, such as basal body temperature (BBT) tracking, may be unreliable in women with SCI.[14] Emergency contraception was mentioned only as a component of professional guidelines that also listed other adolescent health topics for the general pediatric population with disabilities and was not discussed in detail.[15]

Discussion

A fundamental aspect of reproductive autonomy is the ability to choose whether to have children or not. This choice is no less critical for women with SCIs. Studies show that women with SCI are interested in having children,[16] maintain fertility post injury,[4] and have the capacity to safely deliver.[17] However, the timely and effective pursuit of this goal hinges on appropriate counseling and

education on suitable contraception methods tailored to their unique circumstances. This article is written from the perspective of PM&R physicians who identify as women and who have lived experience of contraception use, family planning, pregnancy, childbirth, and child care. Additionally, we collaborated with an obstetrics-gynecology (OB/GYN) physician with practical experience counseling women on contraceptive options and navigating resources to support clinical decision-making for expertise in this field. Though the authors specialize in care for persons with SCI, we cannot speak directly to the lived experience of these individuals and believe that persons with lived experience should be included if meaningful progress can be expected in research and the development of clinical guidelines regarding women's reproductive health after SCI.

Risk–benefit discussions surrounding contraceptive choice may be influenced by medical sequelae of SCI, which vary by level and completeness of SCI. Impaired thermoregulation in individuals with SCI may affect use of fertility planning that incorporates BBT data. Increased risk of deep venous thrombosis in the acute phase following SCI is well documented, however clinical guidelines on the long-term prevention of venous thromboembolism for individuals with SCI do not address use of estrogen-containing contraception.[18,19] It is important to take into account the increased risk of osteoporosis and cardiometabolic disease in individuals with SCI if considering depot methoxyprogesterone due to the additional risk of loss in bone mineral density and weight gain. Contraception-induced weight gain may further affect individuals with SCI who use manual wheelchairs and perform transfers, as higher body mass index has been associated with decreased mobility and increased risk of overuse injuries in this population.[20] IUD placement and etonogestrel implantation pose a risk of AD at the time of insertion for individuals with a higher cervical level of injury, and IUD placement may precipitate AD for women with SCI at or above the T6 level. Although complications of implanted contraceptive devices such as IUD migration are rare, impaired sensation below the level of injury may lead to missed or delayed recognition. These risks, based on the pathophysiology of SCI and data on contraceptive use by the general population, are largely theoretical due to the lack of specific data on contraception use among individuals with SCI.

Individuals with SCI may face additional barriers to using conventional contraceptive methods effectively due to lack of adequate sensation, impaired hand function, and medical sequelae of spinal cord dysfunction. Barrier methods have been shown to carry more risk of failure than hormone or implantable methods of contraception. Additionally, the use of diaphragm barrier methods may be hindered in this population due to impaired hand function, trunk control, and increased tone. Finally, women with SCI may face barriers related to physical accessibility and geographic distance of health care facilities and attitudes by health care providers that have been hypothesized to contribute to disparities in screening for breast and cervical cancers among women with SCI.[21,22]

Of note, the previously discussed contraception options do not protect against sexually transmitted infections, and appropriate counseling must be provided to these patients regarding the use of condoms. Additionally, appropriate screening for sexually transmitted infections including gonococcal and chlamydial infections, HPV, and HIV should be performed as in the general population.[23] Women with SCI who have impaired sensation may also present with atypical presenting symptoms of sexually transmitted infections, including increased spasticity or AD. Providers should be aware of these risks and should include a sexual history in their clinical evaluations and counsel patients appropriately.[24]

None of the methods previously mentioned are guaranteed to be effective. A critical facet of reproductive health that warrants greater attention in the SCI literature is emergency contraception. In situations involving contraceptive failure or sexual assault, women with SCIs should have equal access to emergency contraception methods. It is important to note that access to women's health services and the full scope of family planning services in the United States varies for all individuals, including those with SCI, by insurance, financial means, and geography, especially following the Dobbs Supreme Court

decision in 2022.[25,26] The limited information on the safety and effectiveness of contraceptive options women with SCI may contribute to additional practical barriers for this population.

This review of the literature highlights the paucity of evidence-based information on contraception specifically designed for this population. Though medical advances have made newer contraceptive methods, such as hormonal IUDs and emergency contraception, more widely available for the general population in the last two decades, the Consortium for Spinal Cord Medicine Clinical Practice Guidelines published in 2010, "Sexuality and Reproductive Health in Adults with Spinal Cord Injury," cited a primary reference from 1999, did not reference newer contraceptive methods, and did not examine adverse effects from contraception.[27] Current contraceptive research predominantly centers on able-bodied individuals, leaving women with SCI at a considerable disadvantage. Consequently, health care providers may rely on anecdotal evidence and generic recommendations that may not be appropriate or effective for their specific needs. Major literature reviews of sexuality, reproductive health, and sexual rehabilitation after SCI may omit information on contraception entirely and focus solely on women's reproduction.[28,29] A recent analysis of internet-based sexual health resources for those living with SCI found that information predominantly focuses on the sexual health of heterosexual males and resources addressing female sexuality were comparatively limited and focused almost exclusively on reproduction or women's ability to bear children.[30] These findings underline the need for improving the quality and breadth of information available to health care professionals, trainees, and consumers regarding reliable and effective methods of contraception for women with SCI.

Potential initiatives that could have substantial benefit for providers who care for women with SCI and consumers directly include increased collaboration with OB/GYN colleagues to develop professional practice frameworks, shared-decision making guidelines, and continuing medical education materials.[12] The field of SCI medicine has a long and productive history of cross-disciplinary collaboration and consumer engagement yielding numerous professional practice guidelines and consumer guides on sexual health,[27,31] and these could be updated to include accurate and relevant information about the full range of primary and emergency contraceptive methods available to women with SCI for family planning.

Conclusion

The review has highlighted the need to address critical issues in contraception access and use for women with SCI. There is a need for comprehensive research assessing potential side effects of primary and emergency contraceptive options in this population and for SCI to be included in rehabilitation-specific and wider professional guidelines used by primary care providers and gynecologists, such as the CDC's MEC. Inclusive research, specialized health care training, and tailored health care services are imperative steps toward ensuring that women with SCI can make fully informed decisions about their reproductive health, free from undue risks and obstacles.

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