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Pediatric Patients' Fertility Preservation: Current Situation and Prospects

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ABSTRACT

Pediatric fertility preservation (FP) is a fast expanding specialty. Technologies for (1) preserving reproductive tissue and cells and (2) maturing and using these tissues and cells for future reproduction are constantly evolving. These have already been used by researchers and physicians.

Keywords: Fertility

INTRODUCTION

Many paediatric children are at risk of infertility in the future as a result of medical disorders and therapies. Many oncology patients, for example, are at risk of infertility in the future. Patients with non-malignant diseases who get immunosuppression or a stem cell transplant may suffer reproductive issues. Finally, those with gender and sex variety - those with differences (disorders) of sex development (DSD) and transgender people - may have lower fertility potential. Adult survivors of paediatric malignancies, people with DSD, and transgender people are all concerned about not addressing issues related to future fertility in childhood. According to available data, families want information on FP even if their children are only eligible for the experimental option.

Most urologists serve cancer patients and many also treat people of different genders and sexual orientations. Urologists also provide FP consultations to male patients and execute the necessary surgical procedures. When addressing paediatric FP, it is critical to understand the patient populations who may have fertility concerns, future expectations regarding suitable assisted reproductive technology (ART), and the variety of ethical, practical, and economical issues that may occur. This review covers: (1) Fertility-related issues confronting children undergoing gonadotoxic therapies, as well as those with gender and sex diversity, (2) Current and future options for paediatric FP, (3) Pediatric FP ethics, (4) Issues to consider when developing a paediatric FP programme, and (5) Financial considerations [1].

LITERATURE REVIEW

Disease activity frequently improves during pregnancy, though less than previously thought. Because a significant majority of RA patients still have active disease throughout pregnancy, the use of antirheumatic medicines may be required, especially given that active disease is associated with poor pregnancy outcomes. However, some drugs, such as methotrexate, are known to be teratogenic during pregnancy; additionally, evidence on the safety of other medications during pregnancy are limited. Nonetheless, more drugs are pregnancy-safe than previously thought. As a result, this review covers conception, pregnancy, and lactation concerns in the context of RA (activity) and/or antirheumatic drug use.

Female perspective

Several studies show that family size is reduced in women with RA due to poor fertility, which may even be present before the diagnosis of RA. Women with RA have more difficulty conceiving, as seen by a longer time to pregnancy (TTP). Previous research found that 25% to 42% of RA patients did not conceive within a year. In comparison, the general population has a 9% prevalence of subfertility, defined as TTP lasting more than 12 months, with a range of 3.5% to 24.2% depending on geographic location.

Male perspective

Less is known about fertility problems and pregnancy outcomes

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in male patients with RA, because no good studies have been performed. Lower testosterone levels have been described in men with RA, but whether this results in lower fertility is not known.

Disease activity

Given that disease activity is linked to TTP and pregnancy outcome in RA patients, precisely assessing RA disease activity in pregnancy is critical. Because of increased circulating fibrinogen, plasma expansion, and decreased haemoglobin content [2], the erythrocyte sedimentation rate (ESR) is higher in all pregnant women. In contrast, pregnancy has just a minor effect on C-reactive protein (CRP). Pregnancy may also have an impact on the global health visual analogue scale (VAS). As a result, during pregnancy, disease activity indicators without an ESR and VAS are preferable.

Pregnancy outcome

These disparities in improvement rates between earlier and more recent studies are most likely due to (1) study design (ie, retrospective versus prospective); (2) patient selection, as some earlier studies included only patients with active disease; and (3) the use of different definitions for improvement and remission. Furthermore, clinical and radiographic results have improved dramatically over the last two decades as a result of novel therapy alternatives and a treat-to-target approach, resulting in a higher proportion of RA patients entering pregnancy with low disease activity.

When compared to the general population, pregnancy outcomes in RA patients are slightly worse, particularly in patients with active disease. According to Brouwer and colleagues36, the probability of miscarriage in women with RA (17%) is comparable to that of the general population (11%-22%) [3]. However, the researchers believe that this miscarriage rate in RA patients is an underestimation for the following reasons: (1) The studied cohort consisted of patients with RA who had a planned pregnancy and hence did not use MTX, which is related with an increased risk of miscarriage; and (2) this cohort had fewer smokers and more patients with better education levels than the general population.

Impact for the child

Lower birth weight (even within the normal range) has been linked to an increased risk of cardiovascular and metabolic disorders later in life. This effect is amplified if the youngsters have significant weight gain throughout their first year of life. A recent study found that 28% of children born to RA mothers have quick catch-up growth, which was linked to maternal disease activity. When these children were reassessed at age 7, they did not demonstrate a high-risk profile in anthropometric parameters, such as elevated blood pressure or altered body composition, when compared to healthy controls [4].

Anti-inflammatory drugs

NSAIDs are linked to a longer TTP. NSAID exposure during the first and second trimesters is not teratogenic. After 20 weeks of gestation, NSAIDs can decrease renal function and produce ductus arteriosus constriction, which worsens with gestational age. Furthermore, NSAIDs impede labour; thus, NSAIDs should be discontinued before the 32nd gestational week. Because data on the safety of cyclooxygenase-2 inhibitors is limited, it is occasionally advised to switch to standard NSAIDs during pregnancy.

Pathogenesis

There are other potential pathophysiological explanations explaining the link between varicoceles and infertility, which are outside the scope of this review. In general, it is unknown why some men with varicocele experience infertility while others do not. Multiple variables, including inadequate testicular perfusion, thermal stress, oxidative stress, and endocrine disorders, are thought to have a role in the development of varicocele-associated infertility 19, 20. The uncertainty over which persons with a varicocele may develop infertile is extremely frustrating for clinicians trying to decide whether therapy for pediatric/adolescent varicocele is warranted, given any paternity efforts will take place many years in the future [5].

Several theories about the association between varicoceles and eventual infertility have been investigated in teenagers, though not as thoroughly as in adults. One study, for example, discovered higher amounts of nitric oxide and nitrotyrosine (a marker of nitric oxide damage) in the spermatic veins of teenage varicocele patients. In another investigation, SA values and DNA fragmentation were evaluated in adolescent boys with and without varicocele. Although there was no change in SA characteristics such as concentration, motility, and shape between varicocele patients and normal controls, adolescents with a varicocele had a greater rate of DNA fragmentation. Even when SA measurements are normal, the authors hypothesise that DNA fragmentation may be an early sign of apoptosis and/or oxidative stress [6,7].

Varicoceles provide a clinical issue in the childhood and adolescent population due to the unknown consequences on future fertility, and there are currently no standards in place for the management of paediatric patients with varicoceles. Multiple issues in children/adolescents make determining the effect of varicoceles on future fertility difficult, including: limitations in obtaining and interpreting semen analyses (SA); the potential for unequal differential testicular growth during puberty regardless of varicocele presence; and the potential for a lengthy interval between surgical intervention for varicocele in adolescence and attempts at paternity [8].

CONCLUSION

The goals of this review are to summaries and assess the existing research on the consequences of varicoceles on future fertility in children and adolescents.

CONFLICT OF INTEREST

The author has no conflicts of interest to declare.

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