

Newborn male circumcision

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The circumcision of newborn males in Canada has become a less frequent practice over the past few decades. This change has been significantly influenced by past recommendations from the Canadian Paediatric Society and the American Academy of Pediatrics, who both affirmed that the procedure was not medically indicated. Recent evidence suggesting the potential benefit of circumcision in preventing urinary tract infection and some sexually transmitted infections, including HIV, has prompted the Canadian Paediatric Society to review the current medical literature in this regard. While there may be a benefit for some boys in high-risk populations and circumstances where the procedure could be considered for disease reduction or treatment, the Canadian Paediatric Society does not recommend the routine circumcision of every newborn male.

Key Words: *Circumcision; HIV; HPV; HSV; Infant; STI; UTI*

The cultural and religious ritual of male circumcision has been practiced for thousands of years. Circumcision as a medical procedure arose in Britain and the United States in the late 19th century. The historical medical benefits of neonatal circumcision have included ease of genital hygiene, diminished risk of disease and avoidance of circumcision later in life. In the middle of the last century, most Canadian boys were circumcised. However, the rate of neonatal circumcision has declined over time to the current Canadian average of 32%, with significant regional variability.(1) The Canadian Paediatric Society (CPS) published a position statement in 1996 stating that circumcision was not recommended as a routine procedure for male newborns because the benefits and harms were evenly balanced. A similar viewpoint was expressed by the American Academy of Pediatrics (AAP) in 1999 and reaffirmed in 2005.(2) More recent evidence regarding the beneficial role of male circumcision in preventing urinary tract infection (UTI) in infancy and some sexually transmitted diseases (STIs) in adult life has prompted the CPS to review the current medical information on the circumcision of newborn males. The AAP updated its own policy statement in 2012.(3) The goal of the present statement is to provide guidance to health care providers and up-to-date information for the parents of newborn boys, to enable them to make informed decisions regarding circumcision.

METHODS

A Medline search using the MESH heading “circumcision, male” was initially performed, which yielded 1596 articles. These articles were subsequently reviewed, as were their references when appropriate. The focus was on neonatal and infant male circumcision and its outcomes.

The hierarchy of evidence from the Centre for Evidence-Based Medicine was applied, using levels of evidence for therapy and prognosis.(4)

La circoncision néonatale

Au Canada, la circoncision néonatale est moins fréquente depuis quelques décennies. Ce changement est considérablement influencé par les recommandations antérieures de la Société canadienne de pédiatrie et de l'*American Academy of Pediatrics*, qui ont toutes deux conclu que l'intervention n'était pas indiquée sur le plan médical. Selon des données probantes à jour, la circoncision préviendrait les infections urinaires et certaines infections transmises sexuellement, y compris le virus de l'immunodéficience humaine (VIH), ce qui a incité la Société canadienne de pédiatrie à analyser les publications scientifiques récentes sur le sujet. Bien qu'elle puisse constituer un avantage pour certains garçons de populations à haut risque et dans des situations où l'intervention pourrait atténuer ou traiter des maladies, la Société canadienne de pédiatrie ne recommande pas la circoncision systématique des nouveau-nés.

THE FORESKIN AND CIRCUMCISION

In the male newborn, the mucosal surfaces of the inner foreskin and glans penis adhere to one another; the foreskin is not redundant skin. The foreskin gradually separates from the glans during childhood. By six years of age, 50% of boys can retract their foreskins, although the process of separation may not be complete until puberty: 95% of boys have retractile foreskin by 17 years of age.(5) Parents may be reassured by their observation of an unimpaird urinary stream in a boy with a nonretracted foreskin. Until this developmental process is complete, the best descriptor to use is ‘nonretractile foreskin’ rather than the confusing and perhaps erroneous term ‘physiologic phimosis’.

Appropriate care for the uncircumcised penis has been well reviewed(6) and should include anticipatory guidance on hygiene and an understanding of the normal nonretractile foreskin.

Circumcision involves the partial or complete removal of the foreskin (prepuce); a number of methods are used.(6) In Canada, the majority of newborn male circumcisions are performed by medical practitioners and most of the remainder by skilled traditional providers. Whatever method is used, strict adherence to hygienic principles and the use of effective analgesia are essential.

POTENTIAL BENEFITS OF CIRCUMCISION

Phimosis treatment

Phimosis is defined as a scarring and thickening of the foreskin that prevents retraction back over the glans.(7) Phimosis may occur secondary to recurrent infections, inflammation or lichen sclerosis. Phimosis needs to be differentiated from the normal non-retractile foreskin.

The foreskin can become inflamed or infected (posthitis), often in association with the glans (balanoposthitis) in 1% to 4% of uncircumcised boys.(8,9) The foreskin can also become entrapped

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behind the glans (paraphimosis) in 0.5% of cases. Both conditions usually resolve with medical therapy but, if recurrent, can cause phimosis.(7,10) An estimated 0.8% to 1.6% of boys will require circumcision before puberty, most commonly to treat phimosis.(7) The first-line medical treatment of phimosis involves applying a topical steroid twice a day to the foreskin, accompanied by gentle traction. This therapy serves to thin the tissue and release adhesions, allowing the foreskin to become retractable in 80% of treated cases, thus usually avoiding the need for circumcision.(11,12) Topical steroid treatment is also useful to hasten foreskin retraction in boys with nonretractile foreskins.(12) A number of steroid preparations have been used, including betamethasone 0.05% to 0.1%, triamcinolone 0.1% and mometasone furoate 0.1%.

Other dermatoses of the penis can occur in childhood and should be considered if the skin over the penile shaft, foreskin or glans is abnormal.(10,13) Such presentations may necessitate referral to a urologist or dermatologist for diagnosis and treatment, which may include circumcision.

UTI reduction

The preputial sac provides an environment for colonization of the urethra with uropathogenic organisms that can cause UTI in infant boys.(14) UTI occurs in approximately one in 100 boys in the first month of life. A meta-analysis that included one randomized trial and 11 observational studies found that UTI was decreased by 90% in circumcised infants, with a significant OR of 0.13 (95% CI 0.08 to 0.20).(15) In a more recent meta-analysis that included 14 studies, the pooled prevalence of UTI in febrile infants <3 months of age was 7.5% for females, 2.4% for circumcised males and 20.1% for uncircumcised males. The prevalence rate of UTI in febrile males (circumcised and uncircumcised) decreased to 1.7% by six to 12 months of age, but the 10-fold difference related to circumcision status was maintained.(16) Since the publication of this meta-analysis, a further prospective cohort study, in which a series of urine cultures were obtained in boys up to 15 months of age, also found a lower incidence of UTI in individuals who had undergone newborn circumcision (0% versus 2%, $P < 0.001$).(17) The risk of UTI declines rapidly in males after the first few months of life to an incidence of one in 1000 by one year of age.(16) Using estimates of lifetime risk for male UTI, a recent meta-analysis calculated that, over a lifetime, the RR for UTI was 3.65 for uncircumcised versus circumcised males, with 23% of all UTIs attributed to lack of circumcision.(18) However, this conclusion should be questioned because the adult data were limited to a single study of only 78 men.

It has been estimated that 111 to 125 normal infant boys (for whom the risk of UTI is 1% to 2%) would need to be circumcised at birth to prevent one UTI.(15,16) In boys at higher risk for UTI, such as those with recurrent UTI or an underlying urinary tract anomaly (eg, high-grade vesico-ureteric reflux or obstructive uropathy), circumcision may be of greater benefit. In these cases, it is estimated that only four boys would need to be circumcised to prevent one UTI.(15) However, it should be noted that contaminated urines are more common in uncircumcised males, potentially leading to overdiagnosis of UTI; thus, the number needed to treat may be considerably higher than that found in these studies. Childhood UTI leads to dimercaptosuccinic acid (DMSA)-detectable renal scarring in 15% of cases.(19) Although these scars could theoretically have an impact on long-term renal function and hypertension, there is no evidence for this effect, and most experts believe that UTIs in children with normal kidneys do not result in long-term sequelae.

STI reduction

Observational studies performed in Africa and in developed countries since the emergence of HIV/AIDS have suggested that uncircumcised men are at higher risk for HIV infection.(20,21) The inner surface of the foreskin is rich in Langerhans and other HIV target cells that are exposed to infection during sexual intercourse, which is speculated to be one mechanism leading to HIV acquisition.(22) If true, then removing the foreskin could theoretically have a protective effect against HIV acquisition. Conclusive evidence that circumcision is partially effective in decreasing the risk for heterosexually-acquired HIV infection among men in sub-Saharan Africa has been provided by three large randomized controlled trials involving men and adolescent boys in Uganda,(23) South Africa(24) and Kenya.(25) Compared with uncircumcised controls, there was a decrease in new HIV infection by 50% to 60% in the circumcised male participants. In the Kenyan study, this protective effect was sustained for at least 42 months(25) (Level of Evidence 1). Observational studies undertaken in sub-Saharan Africa have also suggested that there is a similar degree of protection when circumcision is performed in the neonatal period(20,26) (Level of Evidence 4).

It remains unclear, however, whether these conclusions can be applied to populations in developed countries, where the HIV seroprevalence rates are lower and common routes of HIV transmission include injection drug use (IDU) and men who have sex with men (MSM).(27)

The Centers for Disease Control and Prevention (CDC, Georgia, USA) recently published an analysis of the cost-effectiveness of newborn circumcision in reducing the lifetime risk of HIV acquisition in American males, assuming 60% efficacy over a lifetime and a risk of HIV acquisition varying from 0.94% for white males to 6.22% for black males.(28) The CDC estimated that the risk of lifetime acquisition through heterosexual transmission was reduced by 16% overall, ranging from 8% in white males to nearly 21% for black males. The analysis, based on a cost of USD\$257 for the procedure, demonstrated cost savings in both Hispanic and black males. The number needed to treat to prevent one HIV infection varied from 1231 in white males to 65 in black males, with an average in all males of 298. The model did not account for the cost of complications of circumcision. In addition, there is a risk that men may overestimate the protective effect of being circumcised and be less likely to adopt safe sex practices.

In 2011, the Public Health Agency of Canada reported that 46.6% of new cases of HIV in Canada for which an exposure category was reported were attributed to MSM and 13.7% to IDU.(29) The proportion of new cases attributed to heterosexual transmission involving individuals not originally from a country where HIV is endemic was 20.3%, while 16.9% of new cases were in individuals originally from HIV-endemic countries. The report noted that the estimated rate of new infection in the latter group was nine times higher than in the general Canadian population. A disproportionate number of new cases occurred in Aboriginal people (12.2%), a rate estimated to be 3.5 times higher than in the non-Aboriginal population. IDU was the main reported source of exposure (58.1%), followed by heterosexual exposure (30.2%).(29)

It is presumed that male circumcision, by reducing the burden of HIV in men, will indirectly protect women. There does not appear to be a significant role in decreasing male-to-female transmission in HIV-discordant couples.(30,31)

Evidence obtained from observational studies that male circumcision can decrease the risk of other STIs has been conflicting. Analysis of data regarding subjects enrolled in the randomized

sub-Saharan African studies revealed lower rates of herpes simplex virus-2 (HSV-2) seroconversion (adjusted HR = 0.72) and acquisition of high-risk human papillomavirus (HPV) genotypes (adjusted RR = 0.65) in circumcised men during the two-year follow-up postcircumcision.(32) The rate of HPV infection was also lower in circumcised men in many other countries (OR = 0.37)(32) (Level of Evidence 2). Circumcision was not found to be protective against gonorrhoea or chlamydia.(33) No studies have examined the impact of routine neonatal circumcision on STIs other than HIV.

The female partners of men circumcised in the same African studies had a lower adjusted prevalence rate of 0.52 for *Trichomonas vaginalis* infection, 0.60 for bacterial vaginosis and 0.78 for genital ulcer disease.(34)

Although circumcision can decrease the risk of acquiring and transmitting STIs, it should be emphasized that other preventative measures, including abstinence, use of condoms and other safe sex practices, must continue to be taught and practiced.

Cancer reduction

Female partners of circumcised men have a reduced cervical cancer risk, with ORs ranging from 0.18 to 1.61 depending on the sexual-behavioural risk level of their partner(35) (Level of Evidence 3). The incidence of cervical cancer in Canada ranges from nine to 17/100,000.

Penile cancer is rare in developed countries (one in 100,000 men). Squamous cell carcinoma of the penis occurs almost exclusively in uncircumcised men, with phimosis being the strongest associated risk factor (OR 11.4 [95% CI 5.0 to 25.9]).(36) This finding underscores the importance of genital hygiene and of identifying and treating cases of phimosis and residual non-retractile foreskin in all males.

There is a strong association between HPV infection and penile cancer regardless of circumcision status, with 80% of tumour specimens being HPV DNA-positive.(37) It is expected that routine HPV vaccination for girls will dramatically decrease the incidence rate of cervical cancer. The benefit may also extend to penile cancer, especially as the program is broadened to include young men.

POTENTIAL RISKS OF CIRCUMCISION

Surgical procedures, including circumcision, are painful. Even with procedural analgesia, individuals experience postprocedural pain that must be treated. Newborns who experience procedural pain have altered response to later vaccinations, with demonstrated higher pain scores.(38)

Acute complications of neonatal circumcision include minor bleeding, local infection and an unsatisfactory cosmetic result. Severe complications, such as partial amputation of the penis and death from hemorrhage or sepsis, are rare occurrences. A recent meta-analysis reporting on prospective and retrospective studies investigating circumcision found a median complication rate of 1.5% in neonates or infants. When circumcision was performed during childhood, the complication rate increased to 6%, a rate similar to that reported in studies of circumcised adolescents and adults.(39)

The most common late complication of circumcision is meatal stenosis (2% to 10%), which may require surgical dilation.(40) This condition can be prevented almost completely by applying petroleum jelly to the glans for up to six months following circumcision.(41) Partial re-adherence of the penile skin to the glans is not uncommon. Such adhesions often resolve spontaneously by puberty but, when they are extensive, may also benefit from treatment with a topical steroid preparation. Surgical lysis is rarely required.(42)

The foreskin serves to cover the glans penis and has an abundance of sensory nerves,(5) but medical studies do not support circumcision as having a negative impact on sexual function or satisfaction in males or their partners.(43-45) It has been reported that some parents or older boys are not happy with the cosmetic result, but no specific data from the literature to quantify this outcome could be found.

Health care providers should be aware of potential contraindications to neonatal circumcision. Hypospadias requires an assessment by a urologist before circumcision is considered. Any risk of bleeding diathesis requires further investigation and discussion with appropriate professionals and decision makers before proceeding with circumcision.

ETHICS AND LEGALITIES OF CIRCUMCISION

Neonatal circumcision is a contentious issue in Canada. The procedure often raises ethical and legal considerations, in part because it has lifelong consequences and is performed on a child who cannot give consent. Infants need a substitute decision maker – usually their parents – to act in their best interests. Yet the authority of substitute decision makers is not absolute. In most jurisdictions, authority is limited only to interventions deemed to be medically necessary. In cases in which medical necessity is not established or a proposed treatment is based on personal preference, interventions should be deferred until the individual concerned is able to make their own choices.(46)

With newborn circumcision, medical necessity has not been clearly established. However, there are some health benefits, especially in certain populations. Furthermore, performing circumcision in older boys, who are able to provide consent, can also increase risk and costs to the individual.(39) Therefore, some parents view circumcision as being in their child's best interest. A complete discussion of ethical and legal issues associated with newborn male circumcision is beyond the scope of this statement. Readers are referred to the July 2013 issue of the *Journal of Medical Ethics*, which is devoted to the topic.(47) Both parents and health care providers should be familiar with the legal issues related to consent.

SUMMARY

Current evidence indicates that there are potential health benefits associated with male circumcision, particularly in high-risk populations. Infant circumcision reduces the incidence of UTI in young boys and eliminates the need for medical circumcision in later childhood to treat recurrent balanoposthitis, paraphimosis and phimosis. Circumcised men have a lower risk of developing penile cancer, while the incidence of trichomonas, bacterial vaginosis and cervical cancer in the female partners of circumcised men is also reduced. Circumcision in adult men can reduce the risk of acquiring an STI (specifically HIV, HSV and HPV). Minor complications of circumcision can occur, although severe complications are rare. The risk of complications is lower in infants than in older children. The complication rate decreases significantly when the procedure is performed by experienced health care professionals, with close follow-up in the days postprocedure to ensure that bleeding does not increase. It is important to remember that most data regarding the benefits and outcomes following circumcision come from countries other than Canada, which can make application to our population difficult.

Because the medical risk:benefit ratio of routine newborn male circumcision is closely balanced when current research is reviewed (Table 1), it is challenging to make definitive recommendations for the entire male newborn population in Canada. For some boys, the likelihood of benefit is higher and circumcision could be considered

TABLE 1
Potential risks and benefits of neonatal circumcision

Outcome	Effect size (reference)
Potential risks	
Minor bleeding	1.5% (combined)
Local infection (minor)	NNH = 67 (39)
Severe infection	Extremely rare
Death from unrecognized bleeding	Extremely rare
Unsatisfactory cosmetic results	
Meatal stenosis	NNH 10–50 (<1% when petroleum jelly is used)
Potential benefits	
Prevention of phimosis	NNT = 67 (7)
Decrease in early UTI	NNT = 111 – 125 (16)
Decrease in UTI in males with risk factors (anomaly or recurrent infection)	NNT = 4 – 6 (15)
Decreased acquisition of HIV	NNT = 298 (65 – 1231 depending on population) (28)
Decreased acquisition of HSV	NNT = 16 (32)
Decreased acquisition of HPV	NNT = 5 (32,35)
Decreased penile cancer risk	NNT = 900 – 322,000 (36,37)
Decreased cervical cancer risk in female partners	NNT = 90 – 140 (35)

HPV Human papillomavirus; HSV Herpes simplex virus; NNH Number needed to harm; NNT Number needed to treat; UTI Urinary tract infection

for disease reduction or treatment. Health care professionals should provide parents with the most up-to-date, unbiased and personalized medical information available so that they can weigh the specific risks and benefits of circumcising their son in the context of familial, religious and cultural beliefs. Having the right information will enable them to make the best decision for their boys. Decision aids based on current medical information can be helpful.

RECOMMENDATIONS

- The CPS does not recommend the routine circumcision of every newborn male.
- Physicians and other health care professionals caring for newborns must stay informed about circumcision and assist parents in understanding potential risks and benefits of the procedure.
- The parents of male newborns must receive the most up-to-date, unbiased and personalized medical information available about neonatal circumcision, so that they can weigh specific risks and benefits of circumcision in the context of their own familial, religious and cultural beliefs.
- Parents who choose to have their sons circumcised should be referred to a practitioner who is trained in the procedure.
- Neonatal male circumcisions must be performed by trained practitioners whose skills are up-to-date and strictly adhere to hygienic and analgesic best practices.
- Close follow-up in the early postcircumcision time period is critical. The parents of circumcised boys must be thoroughly and accurately informed about postprocedural care and possible complications.
- At the time of hospital discharge, health professionals should ensure that the parents of uncircumcised newborn boys know how to appropriately care for their son's penis and are aware that the normal foreskin can remain nonretractile until puberty.

- Quality Canadian data are required to understand the clinical and economic issues involved with neonatal male circumcision, including its potential risks, benefits and costs, in the Canadian context.

SELECTED RESOURCES

- Canadian Paediatric Society. Circumcision of baby boys: Information for parents <www.caringforkids.cps.ca/handouts/circumcision>
- American Academy of Pediatrics. Circumcision <www.healthychildren.org/English/ages-stages/prenatal/decisions-to-make/Pages/Circumcision.aspx>
- Morris, B. Circumcision: A guide for parents. Circumcision Academy of Australia, 2006-2015 <[www.circumcisionaustralia.org/pdf/GFP_EN\(AU\)_2015_06.pdf](http://www.circumcisionaustralia.org/pdf/GFP_EN(AU)_2015_06.pdf)>

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