Male circumcision: a review of the evidence

Keywords

Circumcision
Male
Religious
Psychological
Sexual Function

Hassan Hirji, Rodger Charlton and Siddharth Sarmah

Abstract

This literature review details how male circumcision has been a subject of debate for many years with different parties quoting different benefits and risks. The incidences of these risks are seldom quantified. This paper attempts to assess the rationale for circumcision on medical, religious and cultural grounds and examines the relative rate of complications. It also attempts to assess the proposed benefits, one of which relates to infection transmission but these are small on a population scale. The stated risks of surgical complications are small. No studies show impaired sexual functioning following circumcision. All complications are increased and of greater severity with untrained personnel performing circumcision. The available evidence does not justify routine circumcision. © 2005 WPMH GmbH. Published by Elsevier Ireland Ltd.

Introduction

Male circumcision is one of the most common surgical procedures carried out all over the world. It is performed for a number of therapeutic and non-therapeutic reasons. It has sparked a lot of controversy and debate regarding its potential benefits and risks and also its association with religious and emotional values. Articles have continued to be published presenting arguments supporting and opposing elective or routine neonatal circumcision [1–8].

Detailed estimates of the financial and medical advantages and disadvantages have been made [9,10]. Groups opposed to neonatal circumcision have been formed and have become visible lobbyists. Examples include the National Organization to Halt the Abuse and Routine Mutilation of Males, San Francisco, and the National Organization of Circumcision Information Resource Centers based in San Anselmo, California, with branches across the United States and in Canada and other countries.

Methods

We indexed Medline articles from 1951 using the reference terms: circumcision, phimosis, and balanitis. Further selection in each category used the terms adverse, complication, benefit, sexually transmitted, social and religious and function.

Additional searches were performed using the criteria of circumcision, STD (sexually transmitted disease), HIV, and AIDS. Social group web extracts were found searching on google.co.uk for circumcision.

Background

The normal uncircumcised penis consists of a cylindrical shaft and rounded tip (glans penis) that are separated by a tissue groove, the coronal sulcus. The fold of skin (foreskin) covering the glans is removed during the circumcision procedure to a point near the coronary sulcus. At birth, separation of the foreskin from the Glans is incomplete. The separation procedure continues through childhood via desquamation and epidermal keratinisation of the shaft. Keratinisation does not occur on the mucosal surface of the foreskin, which may contain specialised sensory cells. Eventually, unforced and complete retraction of the foreskin can be accomplished normally by the age of 5 years.

Hassan Hirji, MPharm MRPharmS
Warwick Medical School
University of Warwick
Coventry, UK
Rodger Charlton, MD
Warwick Medical School
University of Warwick
Coventry, UK
Siddharth Sarmah, MBBS
Department of Elderly Care, Birmingham Heartlands Hospital, UK

Corresponding author.
Hassan Hirji

E-mail:
h.f.m.hirji@warwick.ac.uk

Online 18 February 2005

Prevalence

It was estimated that 69 to 97% of all boys and men in the USA had been circumcised, in comparison with 70% in Australia, 48% in Canada and 24% in the United Kingdom. The reported prevalence of the procedure in the United States increased from about 30% in the 1930s to nearly 80% in the early 1970s. This is attributed to more births in hospital where routine circumcision was common due to perceived health benefits, particularly improved hygiene and reduced penile cancer. Estimates based on the National Centre for Health Statistics indicate that 61 to 65% of male infants were circumcised in the USA during 1987 and 1995. There are also differences in circumcision levels across racial and ethnic groups in the USA and whites are more likely to be circumcised than are blacks or Hispanics (81% vs. 65% or 54%) [11]. Ritual circumcision is common in Jewish and Islamic faiths and in sub Saharan Africa.

Based on recent survey, 54% of paediatricians, family practitioners and obstetricians perform at least 1 circumcision per month [12]. This procedure is relatively uncommon in Northern European countries, Central and South America and Asia.

There is, however, enormous variation between the circumcision rate in the UK (5–6%) and that in the USA (60%). In Britain neonatal circumcision declined from an incidence of around 30 percent in the 1940s to a very low level at present. Still, it remains a common operation, with over 30,000 procedures annually [13].

Current speciality and society recommendations

American, Australian and Canadian American paediatricians are against routine circumcision of newborn infants and are of the opinion that an informed decision should be made regarding this. Parents should be made aware of the potential risks and be provided the opportunity to discuss this decision. Moreover, if the decision has been made, then adequate analgesia must be provided. In a joint publication with the American Academy of Paediatrics, the American College of Obstetricians and Gynaecologists (ACOG) concluded, ''newborn circumcision is an elective procedure to be performed at the request of the parents on baby boys who are physiologically and clinically stable''. The current clinical policy on neonatal circumcision contained in the American Academy of Family Physicians Reference Manual states: ''Current medical literature regarding neonatal circumcision is controversial and conflicting and the decision to perform neonatal circumcision should be based on the informed consent of the parents and requires objective, factual counselling of parents by the family physician [14]. The British Medical Association (BMA) and the British General Medical Council (GMC) recommend that circumcision should be performed only for medical reasons [15]. These guidelines also suggest, as with all aspects of medicine, doctors must act in the best interests of the patients and within the boundaries of the law. Failure to act appropriately disadvantages the patient and may lead to accusations of professional misconduct.

The BMA guidelines allow for conscientious objection on the part of a doctor who does not wish to perform a non-therapeutic circumcision. These guidelines allow for religious circumcision and suggest that a religious representative is invited to be present to ensure religious requirements are met [16–19].

Medical indications for circumcision

Cited medical reasons for circumcision include phimosis and balanitis. Adhesions developing between the foreskin and the glans may prevent the foreskin becoming retractile. Secretions may collect under the foreskin producing infection and subsequent balanitis, or it may produce narrowing of the urethral opening (meatus) called phimosis. These can be alleviated either by division of the adhesions or by circumcision. Phimosis has also been managed by the use of a triple incision as an alternative to circumcision for patients whose parents are concerned about long-term cosmetic and functional complications [20]. There have been suggestions that many boys are circumcised for phimosis, unnecessarily [21–23].

Balanitis is infection and inflammation of the glans penis. It is common in children with poorly retractile foreskins. Balanitis xerotica obliterans (BXO) is a subtype caused by the

presence of lichen sclerosis and atrophicus on the glans penis and prepuce. It produces white scarring of the affected areas that may spread to the distal urethra. Recurrent BXO may produce meatal stenosis. It is commonly managed by circumcision, which removes the cause of the inflammation.

Alternative surgical management has been explored. In an procedure called 'prepucioplasty' the narrow ring of skin is divided across and sutured along. This widens the narrowing of the foreskin without removing the foreskin. For this operation to be successful, the boys need to self retract after the operation for 2–3 months [24].

Certain conditions require preservation of the foreskin and therefore circumcision is contraindicated. These are normally those conditions where the foreskin is required for surgical reconstruction of the penis following congenital disorders. Such conditions include hypospadias, epispadias, chordee, buried penis or a micropenis.

Non-surgical management of phimosis and balanitis

It has been suggested that gentle stretching exercises to loosen and work the foreskin can reduce the tightness in phimosis and balanitis. Such management can take several months. The use of steroid creams as an adjutant to this has been explored. An 87% effectiveness rate in preventing circumcision has been reported [25–27].

The religious precedents of circumcision

Religion is a commonly cited reason for parents seeking circumcision for their sons. Circumcision has been practised for centuries within Judaism and Islam. Circumcision is one of the oldest traditions within Judaism. The initial practice of this is laid down in the book of Genesis as the sign of a covenant between God and the descendants of Abraham [28]. The practice has been continued until today. In some Jewish communities there has been debate as to the need to continue circumcision or whether other practices define being Jewish [29] while in others the practice is deemed essential.

The practice is also followed within Islam. Although circumcision itself is not specified within the Koran, it is widespread and nearly all Muslim men will be circumcised before reaching puberty. The basis is enshrined within tradition, and the justification for this has been examined by a number of Muslim scholars. Muslims who are not circumcised may be subject to social exclusion. It is necessary to be circumcised before a Muslim may make the Hajj, the pilgrimage to Mecca.

Circumcision has been described as a sign of social inclusion. The absence of circumcision for a male within a community in which the practice is common can cause social stigma. In cases of haemophilia, the high risk of bleeding makes non-therapeutic circumcision such as on religious grounds unsuitable. A study in 2000 examined the psychological and social implications of this in Jews and Muslims. Most parents saw circumcision as a mandatory procedure. Significant numbers of haemophilic boys (60%) and their parents (82%) were found to have an inferiority complex because the boys are unable to be circumcised [30].

Methods of circumcision

Three common methods of circumcision are used in the UK and USA. These include use of the Gomco clamp, the Plastibell device and the Mogen clamp (or variations of each of these three devices) (Figure 1). Use of each device involves estimation of the amount of external skin to be removed; dilation of the preputial orifice so that the glans can be seen (Figure 2); bluntly freeing the inner preputial epithelium from the epithelium of the glans; placing the device; leaving the device in situ long enough to produce haemostasis; and amputation of the foreskin. The American Academy of Paediatrics (AAP) emphasises that physicians who perform circumcisions should become

Figure 1 Equipment used currently to perform circumcision [32].

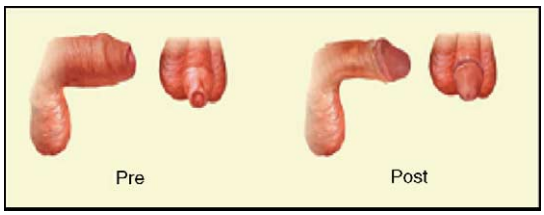

Figure 2 Appearance of the penis before and after circumcision.

sufficiently skilled at the technical aspects of the procedures to minimise complications. Neonatal male circumcision is generally safe, but complications occur in one in 200 to one in 500 infants. These complications are generally minor and usually involve mild bleeding or local infection [31].

Analysis of the information on the benefits of circumcision

It has been suggested that circumcision produces a lower risk of urinary tract infection, confers protection against sexually transmitted infections, penile cancer and cervical cancer in the partner. It has also been suggested that circumcision may cause unnecessary pain to children who are circumcised and has a risk of complications due to surgery. These are now discussed.

Urinary tract infection (UTI) and circumcision

A number of recent studies have addressed the association between circumcision status and UTI.

An association between an increased incidence of UTI and uncircumcised status has been reported. In 1982 a case series of 109 infants in whom UTI developed between 5 days and 8 months of age was reported. Male infants predominated in the series; of these, 95% were uncircumcised [33]. A review of a cohort of 5261 infants born at an army hospital found a higher incidence rate of UTI among the uncircumcised male infants (4.12%) than among those who were circumcised (0.21%) [34]. Anomalies of the urinary tracts of three out of eight patients who had a UTI after ritual circumcision has been reported [35]. Not circumcising male infants has been suggested, therefore, to be advantageous because it allows earlier identification of infants who have structural abnormalities that require surgical intervention or close medical follow-up [36].

Despite the impressive magnitude of the decrease in the incidence of UTI (10-fold or more) associated with circumcision, when one recognises the low overall incidence rate of UTI among infant boys (1 to 2%), several questions arise. Can circumcision be advocated for the prevention of UTI? What are the risks and the costs of this approach? Are there any alternative strategies for the prevention of UTI that should be evaluated? Debate is continuing regarding this.

Circumcision and prevalence of STDs including HIV

The association of circumcision and STDs including HIV and the hypothesis that circumcision might be protective against this virus has generated tremendous interest. The data on circumcision status and susceptibility to HIV infection and other sexually transmissible diseases have been recently reviewed.

Five prospective studies involving heterosexual transmission of HIV-1 found a statistically significant association between uncircumcised and elevated risk for acquisition of HIV (relative risks 2.3–8.1) [31,37–41].

In the other two studies the relative risk exceeded 3 in uncircumcised men, but a low proportion of uncircumcised men and a small percentage of seroconversion limited the statistical power of these studies. Six studies by three different teams working in Rwanda, Uganda, Kenya and Tanzania [42–44] and the USA [41] found no relation between male circumcision and HIV status. The risk of contracting HIV was lower among circumcised men in the developing world, but this was not the case in developed countries [45]. However a subsequent meta-analysis revealed inconclusive findings in many trials [46]. This analysis suggested it was protective in high-risk individuals particularly in developing countries. Its benefit in the developed world is less well established.

At least 16 studies have examined the relation between circumcision and sexually transmissible diseases other than HIV.

In a sample in South Africa 70% of non-circumcised men would prefer to be circumcised if it reduced the risk of STDs, Circumcised

STDs with evidence suggesting lower susceptibility in circumcised men
- Chancroid
- Syphilis,
- Genital herpes,
- Gonorrhoea

STDs where the evidence is inconclusive:
- Non-gonococcal urethritis
- Genital warts

men believed they were at lower risk and so took part in more risky sexual behaviour [47].

Regardless of these findings, behavioural factors are far more important risk factors for acquisition of HIV and other sexually transmissible diseases than circumcision status, and circumcision cannot be responsibly viewed as ''protecting'' against such infections.

Circumcision and penile cancer

A number of case series published between 1932 and 1986 found that all penile cancers occurred in uncircumcised individuals (Table 1) [48–55].

Results of one case control study provide an exception to this general rule, although circumcision status was determined by self-report [56]. Nevertheless, this study also found that the absence of neonatal circumcision increased the risk for penile cancer by a factor of 3.2. Other identified risk factors for penile cancer are:

- phimosis (occurring exclusively in uncircumcised males)
- genital warts
- infection with human papilloma virus
- large number of sexual partners
- cigarette smoking

The AAP policy notes that in the USA only nine to ten cases of penile cancer are diagnosed each year per 1 million men, indicating that although the risk is higher for uncircumcised men, the overall risk is extremely low. Because this disease is rare and occurs later in life, advocating circumcision as a preventive practice is not justified.

Cervical carcinoma and circumcision

The viruses most commonly associated with cervical carcinoma are HPV 16 and HPV 18. Herpes simplex Type 2 is another causative agent. A higher-than-average risk of cervical cancer has been reported among the partners of men who had been previously married to women with cervical cancer. As well, epidemiological studies have shown that starting sexual activity at an early age and having multiple sexual partners predispose women to cervical cancer. However, no relation has been established between exposure to uncircumcised sexual partners and cervical cancer.

Analgesia in circumcision

Some traditional beliefs suggest that the earlier in life that circumcision takes place the less the pain felt by the child. Newborn infants exhibit physiological, autonomic and behavioural responses to noxious stimuli. These responses suggest that they experience pain, and there is evidence that preventing pain in newborns can be important [57]. Newborns who undergo circumcision without an anaesthetic have greater increases in heart rate, cry longer and have greater decreases in transcutaneous oxygen tension than those who undergo the procedure after administration of a dorsal penile nerve block with lidocaine

Table 1 Summary of results in papers comparing circumcision and the incidence of penile cancer

Author	Sample Size	Circumcised	Uncircumcised
Dean 1935	120 cases of penile cancer	0	120
Hardner 1946	100 cases of penile cancer	0	100
Dagher 1972	156 cases of penile cancer	0	156
Persky 1973	77 cases of penile cancer	0	77
Lenowitz 1986	139 cases of penile cancer	0	139
Total	592	0	592

[58]. Behavioural differences have also been reported. Infants circumcised without an anaesthetic were reported to show decreases in responsiveness in comparison with those who received a dorsal penile nerve block [59]. These differences were still evident a day after the procedure. Several methods to provide pain relief have been evaluated. Analgesic methods used include a mixture of local anaesthetics as a cream (2.5% lidocaine and 2.5% prilocaine), the dorsal penile nerve block and the subcutaneous ring block. The AAP notes that the subcutaneous ring block may provide the most effective analgesia. A recent study examined the effects of different analgesics on 132 children who were circumcised in the neonatal period. Those without analgesia showed the greatest pain response. Those with a dorsal or ring block showed the least. The addition of oral sucrose solution reduced distress. This further advocates the use of analgesia in young children undergoing circumcision [59a].

Complications of circumcision

The incidence and nature of the various complications resulting from male circumcision has been the subject of much discussion, particularly among those groups who wish to have the practice ended for non-therapeutic reasons [60,61]. Adverse events may arise as an immediate acute result of surgery, or with effects that persist in the long term, e.g. the psychological and sexual effects.

Further factors include the effect of a non-medically qualified person performing the operation or the age at which the circumcision takes place. There have been reports of a lower incidence of certain complications such as adhesions with increasing age while other adverse events such as penile cancer appear more common with late circumcision. There are also differences in the incidence of such complications in different regions of the world [62].

The overall rate of complication is a matter of debate and, in truth, unknown. Most circumcisions are performed without complication. The estimated rate of complication worldwide has been reported as lying between 0.1 and 35% [63]. The power of these studies and the criteria for complication varies between these extremes. In North America the rate of complication is estimated as lying between 0.2 to 2% [64]. There does appear to be evidence that the incidence of complications in the developed world is lower than that in the developing world. There are multiple confounding factors affecting this rate however. Availability of healthcare, trained personnel and hygiene are all implicated, as is the method of data recording.

Physical adverse events

Physical effects following circumcision include pain, infection, haemorrhage, and incomplete circumcision [65]. Other complications cited include:

- recurrent phimosis
- wound separation
- concealment of the penis
- meatal stenosis
- inclusion cysts
- unsatisfactory cosmetic appearance
- urinary retention.

Anecdotal reports have been published of:

- necrotising fasciitis
- penile lymphoedema
- amputation of the penis
- urethro-cutaneous fistula [65–67].

Complications of circumcision identified by Stenram et al. (n = 117) [22] from Acta Paediatrica Scandinavica 1986:75;321–3.

Postoperative haemorrhage	7
Post op infection	1
Stricture	13
No Complaint	92

Bleeding is a common adverse event seen in circumcisions. No clear incidence was found in the literature but it was estimated at around 1.6% [65]. Most episodes are dealt with using pressure, cautery or sutures. Haemostatic agents may also be used. The tissue glue approximation of circumcision wounds in children has been found a feasible alternative, but offered no extra advantage to suturing [68].

Infection affects a small percentage (0.002–0.63%) of circumcisions. However the

incidence rate varies widely depending on technique, setting and the training of the surgeon. As with haemorrhage no clear rate was found in the literature with rates ranging from 0.63 to 0.002% [63,65]. Infection can be treated with local or parenteral antibiotics, depending on the extent of infection. Due to differences in complication rate or severity no specific management technique can be recommended.

A study in 2000 found that some form of penile adhesions between any remaining foreskin and the glans develop following circumcision and the incidence decreases with increasing patient age. The reported incidence rate ranged from 2% in the eldest to 71% in the youngest under 12 months. Most of these resolved spontaneously with few requiring surgical resolution [62].

Urethral stricture may also occur. A postoperative stricture rate of 11% requiring dilatation has been reported [22].

Sexual function and practice

Complications affecting sexual function have been cited by a number of groups as grounds for the abolition of the practice [60]. Most literature and reports are anecdotal and there have been few randomised trials. It has been claimed that the removal of the foreskin and the associated tissue removes nerves that provide stimulation due to the movement of the foreskin over the glans penis and hence reduces sexual enjoyment [69,70]. Others claim that such loss is due to the increased keratinisation of the glans following the foreskin's removal, which causes a reduction in sensation [69].

A study in Turkey in 2004 that assessed volunteers ($n = 42$, $p = 0.02$) using the Brief Male Sexual Function Inventory (BMSFI) found no significant deficit in sexual function compared with control subjects, but a longer ejaculatory latency time which some considered beneficial [71]. Another study found a slight increase in sexual dysfunction in men who had not been circumcised, particularly later in life (odds ratio 0.66) and that circumcised men engaged in a wider range of sexual practices. There was a lower incidence of anxiety particularly in the sample with the oldest people (ages 50–67 years) and all forms of dysfunction were approximately halved [11]. Interestingly one small study of 15 subjects reported no statistically significant difference in reported sexual drive, erection, ejaculation, problem assessment, or overall satisfaction [72].

The effect of circumcision on female partners of circumcised men

The effect on the sexual enjoyment of the circumcised male's partner has also been claimed to be reduced with less women achieving an orgasm with a circumcised partner [73]. Women also found it harder to manually stimulate circumcised partners during sex [74]. However other studies have shown a preference for circumcised partners among women [75].

Psychological effect

Various forms of psychological effect have been associated with the removal of the foreskin, particularly during the phallic phase of psychological development and have included castration anxiety, concerns regarding physical appearance and partner acceptance. Most reports are anecdotal with no evidence available in the form of controlled studies. However the use of alternatives for the management of phimosis during the phallic period to decrease castration anxiety has been investigated with good results [76].

Boys with hypospadias, phimosis and other congenital anomalies have been suggested to be at risk of developing difficulties in forming sexual identity and different psychopathologies in their childhood and later in life. The surgical operation itself may present a traumatic situation for the child and adversely affect their later psychosexual development. Parental awareness of this is essential following the surgery [77]. Postoperative anxiety regarding appearance can have a negative effect. Nearly 7% of boys circumcised were shy and unwilling to undress in their school gym but there were no signs of a more serious psychological disorder [22].

Lay people

The British Association of Paediatric Surgeons suggests that circumcision be performed only

by those who can perform the procedure, recognise any co-morbidity and complications and have access to medical care should complications arise [17].

Circumcisions performed by lay people are associated with a higher incidence of serious adverse events. In Turkey laymen were responsible for 85% of all complications and nearly all with serious outcomes [78]. This study suggests that circumcisions should only be performed by medically qualified personnel. Furthermore it identified that in cases of 'mass circumcisions', i.e. those with several males being circumcised at a single event, as is custom in some regions of the world, the relative risk of complications was increased by a factor of 3.05.

Anecdotal evidence has seen complications including sepsis, UTI, meningitis and partial amputation that were related to poor subsequent management [79].

An increase in the number of complications following male circumcisions performed by non-professionals has led to the establishment of special clinics for religious circumcisions within the NHS in London, UK. The aim of the service was to provide safe circumcision requested on religious grounds. Parents have generally been very satisfied and the complication rate was considered acceptable [80].

Recently two doctors were found guilty of misconduct by the UK General Medical Council (GMC) by failing to follow established guidelines. Errors included failure to explain the associated risks and benefits, failure to gain written consent and failure to make appropriate notes in the patient's records. These included the identity of the practitioner performing the operation where two doctors were present. Other grounds for concern arose due to poor operating technique in which one doctor did not wear gloves and where sutures were inappropriately passed into the glans penis. Disciplinary action was taken against both doctors. The case highlights the need for good medical practice and experience when performing circumcision and the need to be aware of professional guidelines [16].

Discussion

Circumcision remains an area of controversy. There are clear medical indications where it is needed and others where alternative non-surgical management is available for first line use. Social and religious pressures form the most common reasons for non-therapeutic circumcision. Routine circumcision of all infants is not justified based on current research. The risk of adverse events due to circumcision is relatively low. However, these risks can be significantly increased by the introduction of untrained people, poor facilities and inadequate follow up. Trained medical personnel using an aseptic technique should perform circumcisions wherever possible.

Commonly cited benefits include a reduction in the risk of contracting various sexual and urinary tract infections, less penile cancer in men or cervical cancer in their partners. Penile cancer and UTIs are reduced compared with uncircumcised men however the incidence of such illness is so low that circumcision cannot be justified for prophylaxis. The available evidence shows a small reduction in susceptibility to STDs. These benefits are small and safe sexual practice remains the cornerstone of prevention.

Commonly cited complications tend to be anecdotal with few studies. Frequent adverse events include bleeding, infection and pain. Reports of reduction of sexual function and psychological trauma are not borne out in studies but remain as an anecdotal cause for concern. Implementation of good parental education and support are advised for children who are to be circumcised. The effects of adult circumcision on relationships are dependent upon the social attitude of the individuals within a relationship. The implications of any surgery should be discussed with the patients's partner so as to avoid unnecessary distress.

Web links:

http://www.cirp.org/library/psych/goldman1/

Stop circumcision
http://www.stopinfantcircumcision.org/
www.mothersagainstcirc.org

general interest
http://menshealth.about.com/cs/menonly/a/circumcision.htm
http://www.edae.gr/circumcision.html

References

[1] Altshul MS. The circumcision controversy. Am Fam Phys 1990;41:817–20 [editorial].

[2] Dozor R. Routine neonatal circumcision: boundary of ritual and science. Am Fam Phys 1990;41:820–2 [editorial].

[3] Wiswell TE. Routine neonatal circumcision: a reappraisal. Am Fam Phys 1990;41:859–63.

[4] Thompson RS. Is routine circumcision indicated in the newborn? An opposing view. J Fam Practice 1990;31:189–97.

[5] Schoen EJ. Is it time for Europe to reconsider newborn circumcision. Acta Paediatr Scand 1991;80:573–5.

[6] Bollgren I, Winberg J. In reply to: Is it time for Europe to reconsider newborn circumcision? Acta Paediatr Scand 1991;80:575–7.

[7] Gordon A, Collin J. Save the normal foreskin. BMJ 1993;306:1–2.

[8] Robson WL, Leung AK. The circumcision question. Postgrad Med 1992;91:237–42. 244.

[9] Lawler FH, Bisonni RS, Holtgrave DR. Circumcision: a decision analysis of its medical value. Fam Med 1991;23:587–93.

[10] Ganiats TG, Humphrey JBC, Taras HL, et al. Routine neonatal circumcision: a cost-utility analysis. Med Decis Making 1991;11:282–93.

[11] Laumann EO, Masi CM, Zuckerman EW. Circumcision in the United States: Prevalence, prophylactic effects, and sexual practice. JAMA 1997;277:1052.

[12] American Medical Association. Report 10 of the council on Scientific Affairs (I-99). December 1999.

[13] Williams N, Kapila L. Complications of circumcision. Brit J Surg 1993;80:1231–6.

[14] http://www.aafp.org/policy/camp/4.html, accessed on 10/10/04.

[15] Kallen RJ. Neonatal circumcision. N Engl J Med 1990;323:1206 [letter].

[16] GMC news; October 2004. p8.

[17] British Association of Paediatric Surgeons Guidelines; http://www.baps.org.uk/documents/RELCIRC.html accessed on 31/10/04.

[18] BMA Guidelines. The law & ethics of male circumcision - guidance for doctors March 2003 available at http://www.bma.org.uk/ap.nsf/Content/malecircumcision2003. accessed on 31/10/04.

[19] GMC. Guidance for doctors who are asked to circumcise male children; September 1997.

[20] Fischer-Klein Ch, Rauchenwald M. Triple incision to treat phimosis in children: an alternative to circumcision?. BJU Int 2003;92:459–62. discussion 462. Print 2003 Sep.

[21] Bailis SA. Circumcision for phimosis and other medical indications in Western Australian boys. Med J Aust 2003;178:587–8.

[22] Stenram A, Malmfors G, Okmian L. Circumcision for phimosis–indications and results. Acta Paediatr Scand 1986;75:321–3.

[23] Stenram A, Malmfors G, Okmian L. Circumcision for phimosis: a follow-up study. Scand J Urol Nephrol 1986;20:89–92.

[24] http://www.tornwing.com/peacefulbeginnings/alternativestocircumcision.htm, accessed 12/10/04.

[25] Ashfield JE, Nickel KR, Siemens DR, MacNeily AE, Nickel JC. Treatment of phimosis with topical steroids in 194 children. J Urol 2003;169:1106–8.

[26] Orsola A, Caffaratti J, Garat JM. Conservative treatment of phimosis in children using a topical steroid. Urol 2000;56:307–10.

[27] ter Meulen PH, Delaere KP. A conservative treatment of phimosis in boys. Eur Urol 2001;40:196–9.

[28] The Holy Bible, Genesis 17, 10–11.

[29] http://www.interfaithfamily.com, accessed 12/10/04.

[30] Kavakli K, Kurugöl Z, Göksen D, Nisli G. Should hemophiliac patients be circumcised? Pediat Hematol Oncol 2000;17:149–53.

[31] Task Force on Circumcision, American Academy of Pediatrics. Circumcision policy statement. Pediatrics 1999; 103: 686–93.

[32] http://www.beritmila.com/concepts_instruments.html, accessed 12/10/04.

[33] Ginsburg C-M, McCracken Jr GH. Urinary tract infections in young infants. Pediat 1982;69:409–12.

[34] Wiswell TE, Smith FR, Bass JW. Decreased incidence of urinary tract infections in circumcised male infants. Pediatr 1985;75:901–3.

[35] Amir J, Varsano I, Mimouni M. Circumcision and urinary tract infection in infants. Am J Dis Child 1986;140:1092.

[36] Hopp L. Circumcision and urinary tract abnormalities. Am J Dis Child 1989;143:1262 [letter].

[37] Moses S, Plummer FA, Bradley JE, et al. The association between lack of male circumcision and the risk for HIV infection: a review of the epidemiological data. Sex Transm Dis 1994;21:201–10.

[38] Moses S, Bailey RC, Ronald A. Male circumcision: assessment of health benefits and risks. Sex Transm Inf 1998;74:368–73.

[39] Seed J, Allen S, Mertens T, Hudes E, Serufilira A, Carael M, et al. Male circumcision, sexually transmitted disease, and risk of HIV. J Acquire Immune Defic Syndr Human Retrovirol 1995;8:83–90.

[40] Bailey RC, Plummer FA, Moses S. Male circumcision and HIV prevention: current knowledge and future research directions. Lancet Infect Dis 2001;4:223–31.

[41] De Vincenzi I, Mertens T. Male circumcision: a role in HIV prevention? AIDS 1994;8:153–60.

[42] Grey RH, Kiwanuka N, Quinn TC, et al. Male Circumcision and HIV transmission; cohort studies in Rakai, Uganda. Rakai Project Team. AIDS 2000;14(15):2371–81.

[43] Grey RH, Wawer MJ, Brookmeyer R, et al. Probability of HIV-1 transmission per coital act in monogamous, heterosexual HIV-1 discordant couples in Rakai Uganda. Lancet 2001;357:1149–53.

[44] Agot KE, Ndinya-Achola JO, Kreiss JK, Weiss NS. Risk of HIV-1 in rural Kenya: a comparison of circumcised and uncircumcised men. Epidemiol 2004;15:157–63.

[45] Best K. Male circumcision and HIV risk. Network 1998;18:9.

[46] O'Farrell N, Egger M. Circumcision in men and the prevention of HIV infection: a 'meta- analysis' revisited. Int J of STD & AIDS 2000;11:137–42.

[47] Lagarde E, Dirk T, Puren A, Reathe RT, Bertran A. Acceptability of male circumcision as a tool for preventing HIV infection in a highly infected community in South Africa. AIDS 2003;17:89–95.

[48] American Academy of Pediatrics. Report of the Task Force on Circumcision. Pediatrics 1989; 84: 388–91.

[49] Dodge OG, Kaviti JN. Male circumcision among the peoples of East Africa and the incidence of genital-cancer. East Afr Med J 1965;42:99–105.

[50] Dean Jr AL. Epithelioma of the penis. J Urol 1935;33:252–83.

[51] Lenowitz H, Graham AP. Carcinoma of the penis. J Urol 1946;56:458–84.

[52] Hardner GJ, Bhanalaph T, Murphy GP, et al. Carcinoma of the penis: Analysis of therapy in 100 consecutive cases. J Urol 1972;108:428–30.

[53] Dagher R, Selzer ML, Lapides J. Carcinoma of the penis and the anti-circumcision crusade. J Urol 1973;110:70–80.

[54] Persky L, deKernion J. Carinoma of the penis. CA 1986;36:258–73.

[55] Kochen M, McCurdy S. Circumcision and the risk of cancer of the penis: a life-table analysis. Am J Dis Child 1980;134:484–6.

[56] Maden C, Sherman KJ, Beckmann AM, et al. History of circumcision, medical conditions, and sexual activity and risk of penile cancer. J Natl Cancer Inst 1993;85:19–24.

[57] Anand KJS, Hickey PR. Pain and its effects in the human neonate and fetus. N Engl J Med 1987;317:1321–9.

[58] Williamson PS, Williamson ML. Physiologic stress reduction by a local anesthetic during newborn circumcision. Pediatr 1983;71:36–40.

[59] Dixon S, Snyder J, Holve R, et al. Behavioural effects of circumcision with and without

anesthesia. J Dev Behav Pediatr 1984;5: 246–50.
[59a] Razmus I, Dalton ME, Wilson D. Pain management for newborn circumcision. Pediatr Nurs 2004;30(5):414–7.
[60] http://www.stopinfantcircumcision.org, accessed 12/10/04.
[61] http://www.mothersagaintcirc.org, accessed 12/10/04.
[62] Ponsky LE, Ross JH, Knipper N, Kay R. Penile adhesions after neonatal circumcision. The J Urol 2000;164:495–6.
[63] Christakis DA, Harvey E, Zerr DM, Feudtner C, Wright JA, Connell FA. A trade-off analysis of routine newborn circumcision. Pediatr 2000;105:246–9.
[64] Canadian Pediatric Society, Fetus and Newborn Committee. Neonatal Circumcision revisited. Can Med Assoc J 1996; 154: 769–80.
[65] Ahmed A, Mbibi NH, Dawam D, Kalayi GD. Complications of traditional male circumcision. Annals Trop Paediat 1999;19:113–7.
[66] Woodside JR. Necrotizing fasciitis after neonatal circumcision. Am J Dis Chil 1980;134: 301–2.
[67] Yildirim S, Taylan G, Akoz T. Circumcision as an unusual cause of penile lymphoedema. Ann Plast Surg 2003;50:665–6.
[68] Cheng W, Saing H. A prospective randomized study of wound approximation with tissue glue in circumcision in children. J Paediat Child Health 1997;33:515–6.
[69] Taylor JR, Lockwood AP, Taylor AJ. The Prepuce: specialised mucosa of the penis and its loss to circumcision. Br J Urol 1996;77:291–5.
[70] http://www.cirp.org, accessed on 12/10/04.
[71] Enkul T, Iserl C, Sen B, Karademlr K, Saracoglu F, Erden D. Circumcision in adults: effect on sexual function. Urol 2004;63: 155–8.
[72] Collins S, Upshaw J, Rutchik S, Ohannessian C, Ortenberg J, Albertsen P. Effects of circumcision on male sexual function: debunking a myth? J Urol 2002;168:2134.
[73] O'Hara K, O'Hara J. The effect of male circumcision on the sexual; enjoyment of the female partner. BJU Int 1999;83: 79–84.
[74] Zwang G. Functional and Erotic consequences of Sexual Mutilations. In: Dennison G, Milos M, editors. Sexual Mutilations: A Human Tragedy. London: Plenum; 1997.
[75] Williamson ML, Williamson PS. Womens preferences for the penile circumcision in sexual partners. J Sex Educ Ther 1988;14: 8–12.
[76] Yilmaz E, Batislam E, Basar MM, Basar H. Psychological trauma of circumcision in the phallic period could be avoided by using topical steroids. Int J Urol 2003;10: 651–6.
[77] Kolar M, Kolar D. Psychological aspects of genital surgery in childhood [Article in Serbian]. Srp Arh Celok Lek 2003;131:176–81. Abstract via Pubmed.
[78] Ozdemir E. Significantly increased complication risks with mass circumcisions. Br J Urol 1997;80:136–9.
[79] Menahem S. Complications arising from ritual circumcision: pathogenesis and possible prevention. Israel J Med Sci 1981;17: 45–8.
[80] Shah T, Raistrick J, Taylor I, Young M, Menebhi D, Stevens RA. Circumcision service for religious reasons. BJU Int 1999;83: 807–9.