

Complications of Circumcision

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www.doctorsopposingcircumcision.org
Seattle, Washington

The hundreds of boys I have seen who needed surgery to repair problems caused by their circumcisions are real. The men who lost more parts of their penis than the foreskin are real. The thousands of adult men saying they wish they hadn't been cut are real. Not recognizing that circumcision is harmful is either ignorance or denial.

– Adrienne Carmack, M.D., urologist

Introduction

Infants undergoing non-therapeutic circumcision are unnecessarily put at risk for a wide range of unintended adverse outcomes from the procedure. Though the risks of circumcision are often blandly characterized as being “minor and rare,” some while relatively minor, such as adhesions, are quite common and still distressing, and some, like death, while rare, can be catastrophic.[1,2] Adverse events following circumcision include not only the general risks of any surgery (bleeding, infection, and pain), but also many problems specific to the different circumcision techniques[3] and affected by variations in penile anatomy.[4,5] Babies circumcised in the neonatal intensive care unit or the special care nursery are at four times greater risk for complications than are babies circumcised in the well-baby nursery.[6] Physicians learning the procedure often receive little or no formal training,[7] nor is there any legal requirement for such.[8]

There is no nationwide, standardized, prospective system in the United States or Canada for collecting data on circumcision complications in children, not even for the most serious outcomes. Therefore, no one actually knows how many babies require re-hospitalization, intravenous antibiotics, or a blood transfusion; how many lose all or part of their penis (beyond the foreskin); how many need repeat surgery; or how many boys die as a result of having been circumcised.

This has both ethical and practical implications, for without such information healthcare professionals are unable to adequately inform parents of the procedure's risks, and parents are subsequently unable to give truly informed consent.[9] Furthermore, without this information, there is no way to validly compare the benefits and risks of the procedure – though this is what the American Academy of Pediatrics has nonetheless dared to do, by illogically asserting that “the benefits of circumcision outweigh the risks” even as they admit that they do not know the incidence, impact, or added costs of circumcision complications.[10, p. e772, e775)

For over a century, the complications of circumcision have been repeatedly documented in hundreds and hundreds of case reports and case series, plus dozens of retrospective and prospective studies. In addition, a number of review articles have attempted to summarize the medical literature and/or give overall descriptions, rates, and management information on the various complications.[e.g. 1-3]

Despite all this, it is difficult to pinpoint the incidence and impact of circumcision complications, due to a variety of problems:

- Case reports are crucial for documenting the range and seriousness of the less common complications. However, they cannot be used to estimate accurately the overall incidence of such problems. To capture rates of the more common circumcision complications, other kinds of studies are required.
- Study design has an effect on the estimation of complication rates. Prospective studies, in which complications are tracked going forward from the circumcision via follow-up examinations, theoretically should capture the incidence of complications most accurately.[11] On the other hand, retrospective studies typically rely on a review of patient charts, a form of data that was recorded for a purpose other than research. Inaccuracies in the medical record (e.g. the not uncommon possibility that the complication was not charted in the first place) tend to lead to underestimation of complication incidence.[12] Even less reliable are retrospective database studies which can only capture events that have had an actual diagnostic or procedure code listed upon discharge.[E.g. 13] It has been estimated that database studies may miss up to 90-95% of complications.[14]
- Imprecise and inconsistent definitions for what constitutes a complication are reflected in widely varying study results. For example, Williams and Kapila estimate that “a realistic figure is 2-10%,”[2] whereas Gee and Ansell report a rate of “really significant” complications of 1/500.[15] As another example, the authors of a recent “systematic review” simply did not count “excess residual foreskin or inadequate circumcision” as a complication because these were “not medical complications *per se*” (while admitting, at the same time, that these are adverse outcomes of circumcision that may be serious enough to involve further surgery).[16] This inconsistency makes it difficult to interpret what the various numbers really mean. It also makes it possible for authors to manipulate readers’ understanding of the risks of circumcision, by selectively reporting only the results that are most consistent with their underlying bias..
- The length of follow-up can limit the value of a study’s results. Studies that track problems for only the immediate post-birth hospital stay,[e.g. 17] or for only a month from the procedure,[e.g. 18] fail to account for a host of more long-term complications that may not manifest for many months or years. Short-term studies are unreliable indicators of the true impact of circumcision complications.
- Studies of circumcision complications are typically blind to adverse outcomes that are not strictly medical or surgical. By failing to consider as “complications,” for example, the

impact on psycho-emotional or sexual well-being, or simply the harm of losing a normal, functional body part (which has an incidence of 100%), most published studies paint a very limited picture of circumcision's damage.[19]

The practice of informed consent for circumcision is woefully inadequate,[20] as evidenced by provider survey results, content analysis,[21] and expressed parental desire for more information.[22] Regarding disclosure of circumcision risks, Christensen-Szalanski et al. found that pediatric and obstetric residents routinely informed parents of only three of the many possible complications associated with circumcision (bleeding, infection, and pain).[23] In a survey of mostly family practice physicians, Fletcher found these same three risks were the only complications discussed more than half of the time, and that the most serious complications were the least often covered (e.g. only 8% of physicians disclosed that death was a possible complication).[24]

As a medically unnecessary, non-therapeutic procedure, disclosure for infant circumcision must include the full range of possible complications, including rare but potentially serious outcomes,[25] for consent to be ethically valid.[20] Parents should be informed of the potential for [harm to a male's sexuality](#) and [to his emotional health](#). And somehow the idea must be conveyed that, even if no physical complications ensue, the loss of a normal body part and the violation of a person's right to choice over his body are guaranteed harms.

Still, even if disclosure were complete and unvarnished, there are deeper ethical problems within the issue of complications. The question is whether *any* level of harm or risk is acceptable for a medically unnecessary, elective, cosmetic surgery, especially when the person whose body and life will be most affected cannot give their own considered consent. Doctors Opposing Circumcision unequivocally believes the answer to this question is NO.

Due to the large number of case reports and other publications on circumcision complications, this page can only provide a representative selection of citations. An exhaustive compilation of the medical literature on complications may be found in [Van Howe's monograph on circumcision](#)[14, p. 75-97]. Extensive [galleries of pictures of circumcision damage](#) are also available online.[26]

Bleeding

Bleeding is the most common immediate problem associated with circumcision.[1,2] This is not surprising, since the penis and the foreskin are highly vascularized,[27] and circumcision often truncates the frenular artery, a frequent source of post-circumcision bleeding.

Bleeding can be minor, or significant enough to require clotting agents, cautery, suturing, and/or blood transfusions. Severe blood loss can result in cardiac arrest[28] or death from exsanguination.[29,30] Newborns have a blood volume of about 90ml/kg; the loss of a quarter of this volume (little more than 2 oz. for a 7 lb. baby) can cause an infant to go into shock.[31] Modern super-absorbent diapers may mask hemorrhage, making it difficult for caregivers to assess when bleeding is excessive.[32]

Circumcision devices have design features to provide hemostasis (control of bleeding) with the procedure, through crushing or strangulation of blood vessels. However, old Mogen, Gomco, or counterfeit clamps may be worn or deformed, or parts may be mismatched, failing to adequately crush the tissue,[33,34] or the tissue may not be crushed for a sufficient period of time. With the Plastibell device, failure to tie the ligature tightly or securely enough may result in bleeding.[35] Blood vessels that appear to be adequately crushed at the time of the procedure may open up at a later time. Patel found bleeding to be about twice as common with the Gomco clamp than with the Plastibell,[36] however, Gee and Ansell found the rate to be about the same for the two devices.[1]

The rate of bleeding complications varies widely depending on the study design and the definition of excessive bleeding. For example, in one prospective study, 9.87% of circumcisions resulted in abnormal bleeding,[37] whereas a retrospective chart review found a rate for “hemorrhage” of 1.0%,[1], and a database search found excessive bleeding in 0.083%.[18]

The risk of excessive bleeding after circumcision is increased in the presence of blood clotting disorders, although these are not routinely tested for prior to newborn circumcision.

Infection

Infection is the second most frequent early complication of circumcision.[1] The circumcised newborn is at particular risk for infection because of his immature immune system, and the exposure of the open wound (involving the whole glans) to urine and feces in the diaper. Infection may be mild and localized, or it may be more serious, systemic, and life-threatening, requiring intravenous antibiotics, surgical debridement, and other support measures.

Gee and Ansell reported an infection rate in newborns in the immediate post-circumcision period of 0.4%.[1] Patel, reporting on a series of 100 consecutive circumcisions, found infection in 8 cases (8%), with 1 serious enough to require antibiotics, and 1 progressing to fibrosis and phimosis.[36] Gee and Ansell found a 5-fold increase in infection risk in boys circumcised with the Plastibell device compared to the Gomco clamp ($p < 0.005$).[1] This may be explained by the fact that this method leaves a foreign body (the Plastibell ring) applied to the wound, as the adjacent foreskin remnant undergoes necrosis (tissue death).[1,38]

Serious local infections following newborn circumcision reported in the literature include: scalded skin syndrome (2.7% in a series of 75 Plastibell circumcisions[39]), erysipelas, necrotizing fasciitis,[38,40,41] Fournier’s gangrene, and impetigo[42] (10.7% of a series of Plastibell circumcisions [39]), among others.[14, p. 79]

Numerous studies have found a higher rate of staphylococcal skin infections in the first weeks of life in males, especially among those circumcised, as compared to females.[43-53] In recent decades, several outbreaks of neonatal cutaneous methicillin-resistant *Staphylococcus aureus* (MRSA) infections have been reported, primarily in circumcised boys.[54-63] Infections with antibiotic-resistant bacteria are difficult to treat, resulting in higher morbidity and mortality.[64]

One case-control study found that newborn boys diagnosed with a MRSA infection were 12.2 times more likely to have been circumcised than were the matched controls who did not have MRSA.[65] In one case report, MRSA was recovered from the circumcision wound of a newborn infant whose mother had staphylococcal toxic shock syndrome.[66]

An increased incidence of urinary tract infections in the early post-circumcision period has been reported in association with ritual circumcision.[67-74]

Systemic infections associated with circumcision include: generalized septicemia, meningitis, osteomyelitis, bronchopneumonia, acute post-streptococcal glomerulonephritis, tetanus, diphtheria, syphilis, tuberculosis, and herpes simplex virus, among others.[14, p. 80] Sepsis following circumcision has been reported to lead to disseminated intravascular coagulopathy, jaundice, hypothermia, congestive heart failure, peripheral circulatory collapse, and death.[14, p. 80]

Neonatal herpes simplex virus (HSV) infections can cause death or brain damage.[75] The CDC reported HSV infections in 11 newborn boys in the weeks following Jewish ritual circumcision in New York City between 2000-2011; 10 were hospitalized and 2 died.[76] All the cases were associated with the ultra-Orthodox practice known as *metzitzah b'peh*, in which the operator applies suction by mouth to the fresh penile wound. Authorities have not yet applied effective measures to curtail these preventable infections,[77] and the practice continues, with 6 more circumcision-associated HSV cases reported in New York City since 2011.[77] Historically, tuberculosis and syphilis have also been transmitted to newborns during ritual circumcision, in this same manner.[14, p. 80]

Pain

Research confirms that babies have the neurological capacity to feel and remember pain,[78] and that they may feel pain as much or more than adults.[78,79] According to the American Academy of Pediatrics, “exposure to repeated painful stimuli early in life is known to have short- and long-term adverse sequelae [...including] physiological instability, altered brain development, and abnormal neurodevelopment, somatosensory, and stress response systems...”[80] Little to no research has been done on the long-term neurological or psychological effects of circumcision pain.

The American Academy of Pediatrics has recommended the use of anesthesia for circumcision since 1999.[81] Since that time, more practitioners than formerly are being taught the use of anesthesia for circumcision,[82] however, a fair proportion of circumcisions continue to be performed without any pain relief.[82-84]

Pain – whether intra- or post-operative – is an inevitable consequence of circumcision, whether or not anesthesia is used. A Cochrane Review of pain relief for neonatal circumcision based on 35 clinical trials involving 1,997 newborns concluded that “DPNB [dorsal penile nerve block] and EMLA [topical lidocaine-prilocaine anesthetic cream] *do not eliminate circumcision pain* [emphasis added], but are both more effective than placebo or no treatment in diminishing

it.”[85] A study of 59 circumcisions, in which all of the infants had a DPNB, concluded that “60% of the infants had pain or discomfort associated with the procedure that was excessive.”[86]

More effective methods of anesthesia, such as general anesthesia and caudal blocks, are not used for neonatal circumcision because of the increased risks of using them in infants.

The most common complications of local anesthesia include bruising and hematoma formation.[85] Local anesthesia containing epinephrine can cause vasoconstriction and penile ischemia (tissue deoxygenation),[87] and, in at least one reported case, gangrene of the penis.[88] In several case reports, generalized tonic-clonic seizures were attributed to the use of lidocaine (termed “severe intoxication to local anesthesia” in one of these reports),[89,90] complicated in one case by cardiac arrest.[90]

The use of EMLA cream has been associated with methemoglobinemia in numerous case reports (excess of an abnormal form of hemoglobin in the blood, leading to decreased availability of oxygen to the tissues, including the heart and brain).[14, p.95]

Complications associated with circumcision without pain relief include gagging, choking, apnea, vomiting, and “apparent life-threatening events.”[85,91] Cases of gastric rupture[92] and pneumothorax[93] have been reported in association with vigorous crying from unanesthetized circumcisions.

Surgical complications

The infant penis is very small, and the devices commonly used to excise the foreskin are imprecise tools. Even with proper technique it may be difficult to judge the amount of skin to remove and it is easy for surgical problems to occur.

Removal of too much or too little skin – One common surgical risk of circumcision is the removal of too much skin, involving partial or total denudation of the penile shaft.[14, p. 81] Corrective surgery by a specialist, including possible need for skin grafting, may be required.[2] This may happen more easily with the Gomco technique, in which too much penile skin may be drawn up through the device.[3] Removal of excessive shaft skin can lead to tight, painful erections later in life, or pulling of scrotal tissue onto the shaft due to excess tension on the penile skin sheath.[94-97]

Sometimes so little skin is removed that the penis does not appear to be circumcised. This may generate parental complaints and requests for a repeat circumcision,[3,98,99] although there is no medical indication for the second circumcision. A “loose” circumcision may predispose to adhesions and skin bridges (see below).

Damage to the urethra – Injuries to the urethra can occur with circumcision, and may require corrective surgery. During the dorsal slit phase of the procedure, the blade of the hemostat or scissors may inadvertently be placed into the urethra, leading to damage or even bivalving of the

glans penis. Urethral damage can also occur due to pressure necrosis from the Plastibell ring.[3] Urethral fistula following circumcision has been reported in multiple case reports and case series.[14, p. 81]

Partial or complete loss of the glans or penis – Several of the devices used to perform circumcision involve a “blind” amputation of the foreskin, leading to multiple case reports and case series of partial or complete amputation of the glans.[14, p. 81] The Mogen clamp in particular has been associated with loss of all or part of the glans.[3,100-102] The use of electrocautery devices has led in several reported instances to necrosis and complete loss of the penis.[103-105] In some cases, it was decided to raise these boys as girls.[104,106,107] These amputations are often the source of malpractice cases.[108-110] While the makers of the Mogen clamp are in default for payment of several large settlements against them, the Mogen device remains in use.[110]

Penile necrosis and ischemia, resulting in sloughing of penile skin or even loss of all or part of the penis, are serious complications[111] reported in multiple case reports and case series.[14, p. 81] In one series, the rate of necrosis was 0.8% with the Plastibell device.[112]

Urinary retention – Urinary retention has been reported, typically from bandages that are too tightly wrapped around the wound, or from a Plastibell ring obstructing the meatus, or from pain. Urinary retention has been associated with further complications such as bladder rupture, obstructive uropathy, acute renal failure, urine advancing in subcutaneous fascial planes, and interruption of circulation to the lower extremities.[14, p. 82] One reported case of Plastibell-induced urinary retention resulted in septicemia and death.[9]

Dislocation of Plastibell ring – The Plastibell ring can sometimes migrate past the glans onto the shaft of the penis and be retained there,[113] constricting the shaft in a manner similar to paraphimosis (trapping of the foreskin behind the glans). The dislocated ring can cause compression damage, extensive skin loss, erosion of the corona and proximal glans, swelling and vascular congestion distal to the ring, and ischemic necrosis. Reports in the medical literature have included associated urinary obstruction, urethrocutaneous fistulae, and significant long-term penile deformities.[14, p. 81] The incidence of this pseudo-paraphimosis following Plastibell circumcision has been reported to range between 0.27% [1] and 1.6%. [114]

Hematoma following circumcision is fairly common, with rates reported to be 0.46%, [111] 0.98%, [115] 6.1%, [116] and 7.7%. [117] Hematoma is common enough that it may not be considered out of the ordinary and, therefore, fail to be accounted for as a “complication.”

Other surgical complications have been reported following circumcision, including multiple pyogenic granulomas, subglandular stricture, and scrotal trauma.[14, p. 81] Leg cyanosis, gastric rupture, pulmonary embolism, pneumothorax, erythema multiforme, myocardial injury, tachycardia, and heart failure have all been reported as sequelae of circumcision.[14, p. 82]

Delayed complications

Some circumcision complications may not manifest until months or years after the immediate surgical period. Most studies attempting to track circumcision complication rates do not collect data long enough to capture long-term complications.

Meatitis and meatal stenosis have been associated with circumcision in the medical literature for nearly 100 years.[118] These pathologies of the urinary opening (meatus) are almost exclusively found in circumcised boys,[118-123] and are an iatrogenic result of the loss of the protective functions of the foreskin. Direct exposure of the glans to chemical and mechanical irritation in the diaper can lead to meatal inflammation, resulting in meatal ulceration, and ultimately scarring and stenosis (pathological narrowing) of the meatus.[122] Reduced circulation to the glans penis, caused by damage to the frenular artery with circumcision, may also be a causal factor.[124]

Meatitis is a common finding, with several studies reporting an incidence of about 20% in circumcised boys.[125,126] Meatal stenosis may be the most common longer-term complication following circumcision,[14, p. 83-84) with an incidence variously reported to be 0.9% (most subjects circumcised after 2 years of age),[127], 2.8%, [128] 3.6%, [129] 7.3%, [125,130] 8% [36], 20.4%. [131] and 32.1%. [132]

Symptoms of meatal stenosis include a narrow high-velocity urine stream, difficult-to-aim stream, split stream, pain with voiding, and urinary urgency, frequency, straining, dribbling, and retention. Meatal stenosis obstructs the flow of urine and can lead to further complications including urinary tract infections, vesicoureteral reflux, hydronephrosis, obstructive uropathy, and renal failure.[14, p. 83-84] The definitive treatment for meatal stenosis is meatotomy, a surgical procedure in which an incision is made into the edge of the urinary opening, followed by separation and lubrication of the healing wound several times daily by the parents, over a number of weeks.[122]

Adhesions and skin bridges – Circumcision leaves raw surfaces on the glans and the foreskin remnant. Where these surfaces interface, the tissue may grow back together, forming adhesions and skin bridges between the foreskin remnant and the glans.[133,134] Skin bridges can cause tethering of the penis, entrapment of debris, curvature of the penis, and pain on erection.[133,135] Adhesions have been noted in 8%, [136] 10% [135] and 15% of infants, [133] and in about 25% of circumcised boys overall. [125] While the adhesions which form following circumcision are more dense than the connections normally found between the inner prepuce and the glans, [135] they tend to resolve with time, [125,137] although surgical intervention may be required in some cases. [133,137] The prevalence of skin bridges has been reported to be 4.1% in circumcised boys under 3 years of age, [125] and 12.7% among adult circumcised males. [138]

Phimosis – The skin remaining after circumcision can develop a contracted circular scar that entraps the glans behind an iatrogenic phimosis (stenosis of the foreskin opening). Multiple case reports have appeared in the literature for more than 100 years. [139] The incidence has been reported as 1.7% [140] and 2% in children, [116] 0.3% in infants using the Mogen clamp, [141] 2.9% using the Gomco clamp, [142] and 0.9% in a mixed age clinic population of circumcised

boys.[125] Thus, phimosis following circumcision occurs at least as often as true pathological phimosis cumulatively occurs in boys who are not circumcised (0.6% by one estimate).[143]

Buried or trapped penis – Although buried penis can be present congenitally in newborns,[144] iatrogenic buried penis can occur after circumcision[2] when the penile shaft, no longer tethered forward by the attachment between the inner foreskin and the glans, retreats into the pubic fat pad or into the scrotum. There are multiple case reports of buried penis following circumcision, and most case series of patients undergoing repairs for this problem are populated with males circumcised as infants.[14, p. 84-85] As the young child begins to walk, the fat pad may recede, allowing the condition to resolve on its own,[145,146] however surgical intervention may be required. In one series of healthy boys, 0.9% were considered to have a buried penis with preputial stenosis.[125]

A boy with a congenitally buried penis is at greater risk of having excessive skin removed with circumcision, because the glans naturally resides proximal to the majority of the penile shaft skin. Thus, nearly all the shaft skin is in a position to be removed by the circumcision device. Also, with the penis completely buried, the circular circumcision scar can more easily constrict, entrapping the glans. Congenital buried penis is considered a contraindication for circumcision.[147-151]

Need for repeat surgery – Boys who undergo circumcision are at risk for needing a repeat surgical procedure (sometimes more than one) to repair damage from the original circumcision, to resolve delayed problems such as meatal stenosis or adhesions, or for reasons of appearance. A recent review found that out of nearly 9000 operations of all types at a large children's hospital, 4.7% were for complications resulting from previous neonatal circumcision.[152] The most frequent reasons given for these repeat surgeries were adhesions, skin bridges, meatal stenosis, redundant foreskin (incomplete circumcision with uncircumcised appearance), recurrent phimosis, buried penis, and penile rotation.[152]

A study of 56 cases of circumcision revisions identified “redundant foreskin” as the most common indication given for repeat surgery.[98] In one study, the rate of “inadequate circumcision” requiring repair or re-circumcision was 2.8%.[153] In a series of 200 circumcisions of children in Australia, 9.5% were re-circumcisions (3.5% of the series for “too little skin removed,” 5.5% for post-circumcision phimosis).[154] In a series of 315 circumcisions of children in Denmark, 2% required repeat surgery (1% for “incomplete circumcision,” 0.6% for fibrotic phimosis, 0.6% meatotomy for meatal stenosis).[155] In a series of 79 hospital circumcisions in South Africa, 2.5% required surgical revision.[156] In other studies, the rate of re-circumcision (reasons not specified) was reported as about 1%.[157-159]

A large database study found that, between 2004-2009, the rate of circumcision revisions at pediatric hospitals increased 119%.[160] The authors concluded that “the reasons for this trend are uncertain, but possible explanations include decreased quality of newborn circumcision, increases in the total number of circumcisions being performed, or changing expectations regarding ‘normal’ penile appearance after circumcision.”[160]

Other complications – Miscellaneous post-operative complications reported include chordee,[1] penile torsion,[161] keloid formation,[162] epidermal inclusion cysts,[163] lymphedema,[164]

and cancer in the circumcision scar.[165] Subcutaneous granuloma has been reported to occur after circumcision in childhood at a rate of 5%.[166]

Death

Death is the ultimate harm entailed with any surgical procedure. In cases of true medical necessity, a certain risk of death may be legitimately acceptable to the patient in the overall picture, in balance with the hoped-for benefits. However, when a surgery is medically unnecessary, elective, non-therapeutic, cosmetic, and undertaken without the consent of the patient – as is virtually always the case with infant circumcision – any risk of death, no matter how small, is unacceptable and unethical.

Deaths following circumcision have been acknowledged for a long time, as noted in the Talmud,[167] and continuing to the present day, as documented in published medical case reports, newspaper articles, published coroner's reports, and posts on social media.[e.g. 168] Most deaths are related to excessive bleeding and to infection, as well as to less frequent causes, such as anesthesia accidents and cardiac arrest.[14, p. 90-92,169]

There is no prospective systematic collection of mortality statistics associated with non-therapeutic circumcision in the United States, therefore, the true rate of death after infant circumcision is not known. The primary obstacle to obtaining an accurate estimate of the incidence of death from circumcision is the underreporting of circumcision as a cause or contributor to death.[14] Instead of listing circumcision as a cause of death, the sepsis or hemorrhage/exsanguination that led to the baby's demise may instead be listed. Incomplete and inaccurate death certificates for pediatric deaths are not uncommon.[170]

The 1999 circumcision statement by the American Academy of Pediatrics failed to mention death as a risk.[171] The AAP's 2012 statement characterizes the risk of death as "rare." [10] Often cited is a rate from the 1940s of 1 death in 500,000+ circumcisions (0.2/100,000) according to retrospective review of New York City Health Department records.[172] However, in the same era, Gairdner reported a rate of 16 deaths per year in some 90,000 circumcisions performed annually in England and Wales on children under 5 years old (~18/100,000).[173] Since then, there have been several more recent attempts to ascertain the death rate from circumcision.

Bollinger, calculating from assumptions about general death rates for male newborns and post-hospital complication rates, estimated a circumcision death rate of 9.0/100,000 for the first 30 days of life.[169] O'Donnell, adjusting Bollinger's methods with a different set of statistical assumptions, projected a rate of 1.4/100,000.[174]

A study of medically necessary circumcisions in Brazil (where non-therapeutic circumcision is not performed) found zero deaths out of the small number of circumcisions performed on boys less than a year old (averaging <900/year over a 19-year period).[175] However, taking the death rate for the more numerous circumcisions of older boys into account, the overall circumcision death rate for all children under age 10 was 1.5/100,000.[175]

Rotta analyzed data from the largest U.S. inpatient database on nearly 10 million circumcisions over a 10 year period, looking for excess early mortality in infants who had undergone circumcision.[176] The early death rate attributable to circumcision was found to be 2.0/100,000, with infants circumcised in teaching hospitals and those with bleeding disorders or fluid/electrolyte disorders having a significantly higher risk of death.[176] It should be noted that only deaths that occurred within the same hospital admission as the circumcision could be tracked from this database, thus an unknown number of deaths occurring after initial hospital discharge are not accounted for in this estimate.

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