

De Virginibus Puerisque: The Function of the Human Foreskin Considered from an Evolutionary Perspective

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Abstract — The functional significance of the human male foreskin is considered in evolutionary terms. It is postulated that there is a lifetime's reproductive advantage in delaying the age of first coitus, and hence of first childbirth, for some years after puberty, until the parents are better established as providers. Phimosis and preputial adhesions are common in human males because they have selective advantage, tending to impede and therefore delay the onset of sexual activity. The physical signs of female virginity have an analogous function, and have been selected for in the same way. This hypothesis also provides a consistent explanation for the worldwide tradition of circumcision and for the common practice of masturbation by human males.

Introduction

The topic of routine neonatal circumcision is a perennial chestnut of the medical literature. A few years back, the controversy was rekindled by the findings of Wiswell and colleagues (1–3) that circumcised boys were less liable to urinary tract infections and, more recently, it has again flared up thanks to studies claiming a correlation with susceptibility to acquired immune deficiency syndrome (AIDS) (4). One factor that has been conspicuously absent from this debate – which has been running for at least 50 years – is any clear view of the purpose of the foreskin in evolutionary terms. It is generally supposed to have a protective function, but this does not explain why the human foreskin is very commonly too tight to permit retraction, or adherent to the glans, or both. All male mammals have foreskins, but these complications are

rare in species other than *Homo sapiens*. Such problems would, a priori, be expected to reduce reproductive success, and hence to have been selected against in evolution.

Without a foreskin, men are less liable to balanitis, penile cancer (5–7) and urinary tract infections (1–3). This would imply that a foreskin is likely to shorten a man's lifespan and reduce the number and success of his offspring. Some males are born with very short foreskins, and a few have virtually none. If such males had advantages – however slight – in reproduction and longevity, this trait should have become dominant. One possible explanation is that, before humans adopted clothing, the protective effect of the foreskin had a significant selective advantage. However, in almost one quarter of uncircumcised adults, the foreskin does not cover the glans penis (8), so that the protection it confers is minimal. This is a

condition that is virtually never observed in other mammals, and it suggests the protective effect of the foreskin has ceased to have selective value in humans. The change from quadrupedal to bipedal locomotion was probably more significant than the adoption of clothes in removing the penis from the risk of damage. Looking at the customs of traditional cultures, one finds that most Australian Aborigines, and many African tribes, were circumcised and wore no clothes. They were not visibly disadvantaged by their lack of a protective prepuce – in fact, groups which did not circumcise were in a minority in these regions. There is thus no clear evidence to support the protection hypothesis.

Here, I present an alternative hypothesis to explain both the continued presence of the foreskin, and why phimosis and attachments are so much more common in *Homo sapiens* than in other mammals. This hypothesis also provides a functional explanation for the occlusive hymen and constricted introitus which form the physical signs of female virginity. These are also rarely present to such an extent in other mammals, and can be viewed as the female counterparts of the same problem (and indeed are regarded as such in some societies). It also provides an explanation for some otherwise puzzling aspects of human male sexual behaviour.

Evidence and discussion

Gairdner (9) looked at the normal development of the foreskin, and showed that adhesions between the prepuce and the glans penis were normal in the neonate. Of 100 newborn males, only 4% had a retractable foreskin, and nearly half had foreskins which could not even be retracted sufficiently to expose the urinary meatus. This much is well known and frequently cited, but less often considered are his observations on the development of the embryonic prepuce. He showed that the prepuce develops as a ridge which grows over the embryonic glans and *subsequently* becomes adherent to it. This carries the implication, at least, that selection has favoured the development of adhesions between two epithelia which are of separate origin.

Phimosis persists considerably beyond the neonatal period in a large proportion of cases. In Gairdner's study, 20% of 200 schoolboys between the ages of 5 and 13 still had foreskins which were not fully retractable (9). A survey of 1000 soldiers in the British Army found that 8% had foreskins which could not be retracted (10). These are high figures when it is considered that, in the UK at that time, it was considered desirable that a boy's foreskin should be retractable

(9), and boys and their parents were encouraged to manipulate the skin to promote retractability. Where simple manipulation could not achieve this end, either circumcision or dilation and separation of adhesions were commonly carried out (9). In a recent Australian survey of 106 women, 81 had had uncircumcised lovers and 10 of these (12.5%) reported problems with partners who suffered from phimosis (8). In Australia circumcision is common (70% of the male population) and quite a high proportion of circumcisions (26%) are carried out after the neonatal period because of foreskin problems (8). It is, therefore, surprising to find that phimosis is still so prevalent.

These figures suggest that if boys and their parents did not manipulate the prepuce to aid retraction, and if a substantial proportion of problem foreskins were not removed surgically, the incidence of phimosis in young adults would be much higher. Studies on other cultural groups confirm this. In Japan, around 50% of males suffer from foreskins which are too tight to permit intercourse or adequate hygiene (11). In Bali (where, unlike the rest of the Indonesian archipelago, circumcision is not practised) phimosis affects half the male population aged 18 or over (12). There may, of course, be racial factors involved here, but the Balinese study (12) emphasizes the point that cultural traditions associated with the Hindu religion forbid medical intervention with the foreskin. In Japan, although circumcision is uncommon, the common custom is for adult males to wear their foreskin retracted (13). This implies that there would be social pressure on boys and adult males to make their foreskins retractable – in spite of which many evidently do not succeed.

The manipulations used in Western countries generally consist of repeatedly attempting retraction, with or without the use of some degree of force, until the foreskin is sufficiently stretched and all adhesions have separated. There is considerable controversy over the merits of forcibly retracting a tight foreskin versus persistent but gentle attempts. Other cultures add alternative techniques. In Tahiti, boys and youths commonly restrict the orifice of the prepuce during micturition, so that the pressure of the urine dilates the foreskin and thereby separates the adhesions (13).

The conclusion must be that, without manipulation to make the foreskin retractable, and often medical intervention when this is not achieved, a high proportion of males – probably more than 50% – would attain adulthood with a foreskin which was too restrictive to permit normal sexual activity. This approaches the proportion of females (often stated to be about 70%) in whom the introitus vaginae is too narrow, or the hymen too occlusive, to permit first coitus without difficulty. In both cases, first intercourse would require

considerable patience, and probably some degree of tearing and pain, for both males and females.

In Western society, female virginity has traditionally been prized, and manual manipulation of the female genitals during childhood and adolescence is strongly discouraged. This is not the case in all cultures – in some African societies, a woman for whom first coitus was difficult would be regarded as having failed to prepare herself for the duties of matrimony (14). (In Western society, girls often ridicule young men suffering from phimosis in similar terms (8).) In other words, a tight preputial orifice and adherent foreskin are just as much symbols of virginity, and just as ‘normal’, as a constricted introitus and the presence of a hymen. That we do not commonly think of them in these terms is purely a result of the Western cultural tradition. There are societies in which this equivalence is formally recognized. On the Polynesian island of Tongareva, ceremonial defloration by an older partner was a custom at puberty for both sexes (15). In the case of a boy it was known as ‘*kia motu te sele*’ – to snap the tie. An older woman would take the boy to a private hut, and retract his foreskin, stretching it and separating any adhesions, until the glans was fully exposed. Coitus would then take place. Girls went through an exactly analogous ceremony with an older man. Both sexes were expected to have comparable symptoms of physical virginity, and cohabitation with a carefully selected, experienced, partner was regarded as a practical (and egalitarian) method of coping with the problem.

Having established the formal equivalence, and the common occurrence, of the physical symptoms of virginity in both sexes, we are forced to the conclusion that they must have positive selective value. Far from reducing reproductive rates, these barriers to first intercourse must confer overall benefits on the species. This can be explained as a consequence of the well-known fact that humans take a disproportionately long time to reach maturity. Children are dependent on their parents for around one quarter of their lifespan, whereas 10% or less is typical in other mammals. Even in the most primitive societies, adolescents are not in a position to offer their offspring an adequate chance of success until they have established themselves, which will not happen until some years after physical puberty. Establishing themselves, in this context, means developing their skills as hunters and gatherers, or acquiring the land and skills for agricultural subsistence, to the point where they are able to provide for others as well as themselves. If they had children before this point was reached, the added drain on their resources would probably prevent their *ever* reaching this point, affecting the survival chances of both their first, and all subsequent, offspring.

On this view then, human males have a restrictive foreskin *precisely because it is a hindrance to sex*. The female hymen is there for the same reason. These obstacles to coitus delay the onset of sexual activity, prevent sex and marriage interfering in the learning process and make young adults less likely to be saddled with dependents before they are able to care for them. Postponing first sexual activity has a positive value for the survival of the species which outweighs the concomitant shortening of total reproductive lifespan. This positive benefit must also exceed the relatively minor medical disadvantages (susceptibility to infections and cancer) which a foreskin confers. Once sexual experience has been attained, the foreskin’s function is over, which explains why it is so common to find the glans exposed, or only partly covered, in adult, sexually experienced men.

This hypothesis provides an explanation for the widespread occurrence of circumcision – the world’s oldest, and commonest, surgical operation. Circumcision has traditionally been practised throughout Africa, much of Asia, South and Central America, Polynesia, Melanesia and Australia (13,14,16). Originally, the operation was carried out on mature teenagers as a sign that sex was now permitted to them. This is still the case in many cultures (17), and it is clear that all circumcision traditions started in this way (13). In this way, the foreskin is allowed to carry out its role of discouraging sex until the boy is ready for adulthood. Circumcision then removes the impediment to coitus, and also provides protection against infections such as balanitis during adult, reproductive, life. By establishing a cultural condition that coitus is only permitted once the foreskin is actually removed, not merely retracted, the biological restriction on early cohabitation is made more effective. Circumcision at maturity both reinforces and enhances a natural evolutionary trend, and hence is likely to be beneficial to cultures which practise it. Given the morbidity likely to attend primitive circumcision operations (17), this benefit must be reasonably substantial.

It is also possible to make sense of another puzzling feature of human sexual behaviour in the light of this hypothesis. Human males almost all masturbate, particularly during adolescence (18,8). While masturbation has been observed in many mammals, it is uncommon, and is rarely continued to the point of ejaculation. Human males, on the other hand, frequently masturbate to ejaculation, a form of sexual behaviour which does nothing to continue the species. The requirement of postponing first coitus provides an explanation for this. The sex urge is strong in a young teenage boy, and must find some outlet. Masturbation has evolved to provide a substitute release during this period.

In fact, the same anatomical features which hinder

intercourse seem to facilitate masturbation. Badger (8) showed that circumcised and uncircumcised males masturbated in quite different ways. Circumcised males masturbated using the hand with a lubricant in motions which mimicked the friction of coitus. Uncircumcised men, on the other hand, masturbated by manipulating the foreskin in a motion which did not imitate the stimulation of normal intercourse. Women reported that it was much easier to masturbate a man with a foreskin, and in fact circumcised men masturbated rather less frequently than uncircumcised. Since coitus is the normal means of sexual release in the human male, one would imagine a priori that the most effective means of masturbation would be that which most closely simulated it. That this is not so reinforces the idea that masturbation has evolved as a means of sexual release in its own right. It appears that, as well as becoming an obstacle to first coitus, the foreskin *has also evolved to provide a specific alternative form of sexual release* for the adolescent male. Without the presence of such an alternative in the critical post-pubertal years, the obstacles presented by male and female virginity would be much less effective in postponing cohabitation.

Conclusions

Most male mammals have a foreskin which provides substantial protection for the flaccid penis, but which remains well behind the glans penis once the organ is erect. In humans, this is not so – in young males, it often completely covers the organ in both states, while in older, sexually experienced males it often does not cover the glans even when flaccid. This suggests that the common view of the prepuce as providing protection is only of minor importance in *Homo sapiens* (except perhaps during childhood). This paper presents an alternative view – that the foreskin in humans has become modified through natural selection to form an obstacle to early coitus. Phimosis and preputial adhesions, rare defects in other mammals, have become common because of the selective value of postponing childbearing for some years after physical puberty. Concomitantly with this, masturbation has had selective advantage as an alternative means of sexual release, and the foreskin has also developed specifically to facilitate this. The occlusive hymen and restricted introitus which form the symptoms of physical virginity in females have likewise evolved as hindrances to early cohabitation. Anthropological studies could provide further evidence supporting (or opposing) this hypothesis, for example by quantifying the incidence of phimosis in a culture in relation to its customs regarding the foreskin.

As human societies evolved, circumcision at the age when marriage was permitted became a common practice, effective because it provided cultural reinforcement for a trait with strong selective advantage. The relevance of this to neonatal circumcision in the twentieth century is not so clear, however. Present-day social structures have largely taken over the role of controlling adolescent sex and delaying first childbirth. In Western societies, it has become customary to remove the natural symptoms of male virginity, either surgically or by non-sexual retraction of the foreskin. Insofar as the original function of these symptoms has been superseded by social structures, this practice may be advantageous, but circumcision and retraction (if both are equally effective) would be equivalent from this viewpoint. The decision on whether or not to circumcise babies must be taken on other criteria than these, and the debate will doubtless continue into the next millennium. However, the presence of a rational explanation for the function of our rather unusual sort of prepuce may at least drive some of the highly irrational statements about it out of the debate.

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