

# The intromission function of the foreskin

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**Summary** Masters and Johnson observed that the foreskin unrolled with intercourse. However, they overlooked a prior observation that intromission was thereby made easier. To evaluate this observation an artificial introitus was mounted on a scales. Repeated measurements showed a 10-fold reduction of force on entry with an initially unretracted foreskin as compared to entry with a retracted foreskin. For the foreskin to reduce the force required it must cover most of the glans when the penis is erect. This may occur only in humans. These observations mean that foreskin and prepuce can no longer be considered synonymous. Why the penises of humans and chimpanzees evolved so differently should be addressed in light of these findings. © 2002 Elsevier Science Ltd. All rights reserved.

## INTRODUCTION

Morgan (1,2) stated that vaginal intromission is easier with a (retractable) foreskin in place. However, no one has experimentally tested his contention or clearly explained the mechanism. There are no contradictory claims in any of the citations to Morgan's letters. Harnes (3) published a 'fruitless' attempt with a questionnaire to evaluate Morgan's claim of greater sexual pleasure with a foreskin. Articles about circumcision and evolutionary antecedents of human sexuality have almost totally neglected the even more general question: the function of the foreskin. The recent position paper of the American Pediatrics Association is silent on this issue (4). A heated debate in the *New England Journal of Medicine* produced no references and only a single sentence regarding the function of the foreskin, '...protection of the sensitive glans' (5). Porter and Bunker (6) in an article entitled, *The dysfunctional foreskin*, say only '...its function – physi-

cally, physiologically and immunologically protective of the glans and external urethral orifice.'

Several recent publications have considered evolutionary antecedents of human sexual behavior and unusual primate male genitalia but they do not mention the foreskin or prepuce (7–9). Money (10) cites a survey finding that the foreskin is a 'visual and tactile erotic organ.' Cox (11) postulates, without evidence, that the foreskin retards the age of sexual reproduction. There is little in the older literature they missed. Even in an article entitled, 'Observations on the evolution of the genitalia and copulatory behaviour in male primates, (12) there is no mention of the foreskin or prepuce! All the *Textbook of Sexual Medicine* (13) says, without references, is 'There is much controversy and little data surrounding the question of the effect of circumcision on male function.'

## EVIDENCE

Preliminary measurements of the force required for intromission with and without the benefit of the foreskin have been made with a simple device. The device consisted of a Styrofoam cup the bottom of which was cut to make a flexible artificial introitus. The cup was mounted on a diet scales so that the force being applied could be noted (Fig. 1). Twelve measurements were made with the glans penis alternately exposed or covered by the

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**Fig. 1** Device for measuring penile force during intromission. (Diet Scales, Hanson Scale Co., Division of Sunbeam Corporation, P.O. Box 38, Highway 45 North, Shubuta, Mississippi, 39360.) Lower left: an artificial introitus was made by cutting a quarter size piece out of the bottom of the an 8 1/3 ounce foam beverage cup (Western Family Space Saver Insulated FOAM CUPS, Western Family Foods Inc., Portland, Oregon 97223.) and making 8 equidistance cuts from the margin to the thickened rim of the cup. The length and number of cuts determined the stiffness and expansibility of the 'introitus' and hence the ease of intromission.

foreskin. Intromission with the glans exposed required a minimum of 500 g of force and was uncomfortable. In contrast, only 40 to 50 g were required for complete insertion of the glans when it was initially covered, and there was no discomfort. Thus, initiating intromission with the foreskin covering the glans resulted in a greater than 10-fold reduction in the force needed to penetrate an 'introitus' and make an otherwise uncomfortable intromission comfortable.

Several factors can be expected to affect the required force. The degree of exposure of the glans with an erection, the size of the penis and the length of the foreskin. If the artificial orifice is smaller than the size of the exposed gland then there will be more friction. With a large glans more friction can be expected and the force required would increase after the foreskin has com-

pletely unrolled. In this trial the exposure of the glans was just under 1 cm with erection of the penis while the opening of the artificial orifice was 2.4 cm. The lateral diameter of the erect glans was 4.1 cm. The maximum distance the foreskin moved up the shaft (not including the glans) was 6–7 cm, depending inversely on the degree of turgor in the glans. The limiting factor was tension in the area of the frenulum, which decreased with loss of turgor in the glans.

## DISCUSSION

These preliminary findings support the claim by Morgan (1,2) that vaginal intromission is easier with a (retractable) foreskin in place. The mechanism is simple. The interposed foreskin decreases the friction between the introitus and the glans. The unretracted foreskin consists of a thin dermis that is folded on itself with very little friction between the layers. As the penis advances, the foreskin unrolls so that the portion that makes initial contact with the introitus is 6 cm. Up the shaft before any friction occurs between the device and the skin.

These observations were limited to a single subject with an artificial introitus. However, this function of the foreskin is likely to be a general phenomenon. Masters and Johnson report (14), 'Only 6 of the 35 uncircumcised study subjects failed to demonstrate significant exposure of the glans during or immediately subsequent to active coition.' They also note that this happened occasionally during auto manipulation. These statements imply that none of the subjects significantly exposed the glans by an erection and that the act of intromission generally rolled the foreskin back.

Current dictionaries use the terms foreskin and prepuce interchangeably. It is now possible to make a clear distinction between them. According to Roberts (15), 'The **prepuce**, or sheath, is a double invagination of skin which contains and covers the free portion of the penis *when not erect* (italics mine) and covers the body of the penis behind the glans when the penis is erect.' A **foreskin** is a double invagination of skin that covers the glans when the penis is erect and is retracted over the body of the penis with intromission.

*Homo sapiens* may be the only species that has a foreskin. Farm animals have prepuces (15). There are no published statements on non-human primates that allow classification. Personal communication indicates many if not all Macaque species of monkeys do not have foreskins (16). There is a prosimian species described as having an '...ample prepuce which narrows over the apex glandis in singularly human fashion' (17) but the size of the flaccid penis looks small and seems unlikely to remain covered during an erection. The flaccid human penis is said to be uniquely large in relative size (7).

Also Hafez (18) says, 'Man is exceptional in attachment of the prepuce very close to the glans.' Both features may have been important in the evolution of the foreskin.

Primates other than chimpanzees generally have glans but with highly variable shapes (12,19). Chimpanzees lack glans (20,21) and their prepuce may fail to fully cover the tip of a very pointed penis even when it is flaccid [see picture, (20)]. The marked differences between early and late primates and between the late primates themselves raise interesting questions. What were the reproductive advantages to cause the evolution of such varied penises? How did these evolutionary forces tie in with the increasing use of sex for social purposes seen in chimpanzees and *Homo sapiens*? Thornhill and Palmer (22) make a case for rape as an important ancestral strategy to allow males to obtain a higher number of mates. However, neither they nor Palmer (23), who reviews the evidence for rape in non-human species, can point to anything besides the notal organ of the scorpionfly as '...a trait being designed specifically to promote successful reproduction by rape.' Recognition that the foreskin makes intromission easier raises the possibility that it is an organ specifically designed for rape. The pointed penis of the chimpanzees might have been an alternative adaptation for the same purpose. However, unlike the common chimpanzee (23), it would appear that it is no longer useful in the pygmy chimpanzee, since they have never been observed to rape in the wild (9).

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