SPECIAL ARTICLE

VENEREAL DISEASES IN ANIMALS

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Though man's study of Man is the most interesting of all pastimes, a close peep into the nature, manifestations and sequelae of the sexually transmissible diseases in animals along with a comparative study of those maladies in relation to venereal diseases in human beings are bound to be illuminating and instructive to venereologists. It is even profitable to learn whether the sexual diseases of human beings occur in animals, whether they could be experimentally transferred to domestic or laboratory animals and whether abortions and infertility could be caused in human beings by venereal diseases as in animals.

There are in animals certain peculiar anatomical features which must be borne in mind. (1) The penis of a soliped is well protected by membrane supplied with sebaceous glands and is not usually affected by pathogens (except in vesicular V. D.) In ruminants and swine it is covered with a delicate mucosa which is vulnerable to organisms and so balanitis is caused. (2) Bulbo urethral glands are small in all species and are not the seat of notable disease. (3) The prostate is highly developed in carnivora and dogs and may get affected while in herbivora it is not conspicuously diseased. (4) Ampullae are well developed in ruminants and solipeds and are absent in boars. (5) Seminal vesicles are highly developed in herbivora and hence commonly diseased in bulls and stallion. They are large sized in boars and absent in dogs. (6) Cervix uteri are elaborate in cows in which they get frequently diseased, though they are regarded as important barriers against invasion of the uterus by organisms, from the vagina.

(A) *Coitus* may transmit diseases to various portions of the genital organs in many species of animals. The hybrid mule and the castrated and spayed animals without sexual burden are virtually free from genital diseases. The general belief is that different bacteria invade the reproductive system during coitus as is evidenced by the increased number of bacterial organisms in the uterine cavity or in the aborted foetuses. At times some enter the genital organs by systemic infection (through alimentary, respiratory tract or skin). Trichomonad disease of cattle is primarily transmitted by coitus and the same is true of Dourine in horses. Brucellosis, vesicular V. D., nodular V. D., canine venereal tumour, rabbit cuniculosis, vibrionic abortion, epizootic infertility (Bovine) and genital tuberculosis are other common conditions transmitted venereally. There are other minor diseases such as listerosis which may be also acquired nonvenereally. In many herds, cows bred to sires having ampulovesiculitis contract cervicitis, metritis & salpingitis, and their foetuses are aborted. Hence coitus should never be permitted with an infected animal. Thus prevention of V. D. calls for precautions at the time of matings

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(B) Though the dairy-heifer may be suffering from infectious vaginitis from early calfhood, coitus sets it aflame and causes uterine and ovarian diseases. Thus coitus in animals may *worsen an already existing genital condition.*

(C) *Sexual Overload.* There is increased virulence of genital infections due to sexual overloading. Trichomonad disease becomes intensified and more virulent by coitus. The infected bull may not infect the cows he mates with, so long as he is limited to one coitus in several days, but when he is caused to serve daily for several days he transmits his malady to a large ratio of cows mated with. Similarly a stallion, mildly infected with dourine, if continued in service for some time, gets its malady rendered more virulent under the strain of repeated coitus and transmits the disease to an increasing proportion of mares mated with.

(D) *Abortions.* In 1887 Isepponi, after extensive studies, described that in cattle Infectious vaginitis caused abortions and many in Europe supported his views. But when in 1897 Bang made his epochal announcement about the discovery of Bacillus abortus causing Infectious abortions, wide conflicting opinions arose and in 1925 at Munich it was declared that Infectious vaginitis was not a cause of Epizootic abortion.

Health of both sexes is equally vital to physiological reproduction and successful animal husbandry depends upon the mating of two healthy mature animals primarily. The foetus is beset with the perils inherited from a defective ovum or spermatazoon with teratological defects and it may be aborted; it is also exposed to the perils of infection domiciled in the generative organs such as the tubes whose infection causes a high ratio of death of fertilised ova; It is likewise imperilled by the pathogenic invaders that may reach the uterine cavity following coitus or otherwise. Abortions as well as mortality of the new-born may be caused by many venereal diseases in animals. Trichomonads occupy an important position as a peril to bovine reproduction; Bang's B. abortus, vibrio foetus, staphylococci and viruses also cause abortion in cattle. Bac abortus, Bacillus pyogenes streptococci genitalis, staphylococci, trypanosoma equiperdum, salmonella abortivo equina, colon bacilli T. B., and viruses are the organisms responsible in mares. B. para typhus, abortus ovis, diplococci and viruses cause abortion in ewes; while micrococci mellitensis are responsible in goats., B. abortus, B. paratyphus and diplococci cause abortion in swine. Most of these infections are venereally acquired and hence all such diseased animals should be withdrawn from breeding. However abortions are rare in dogs and cats as they are free from these abortifacient genital infections of the farm animals.

Venereal Diseases in Cattle

(1) *Trichomonad Disease* in animals is essentially a true V. D. but rarely may be spread in other ways too. In human beings the mode of infestation is not definitely known, though trichomonads could be venereally transmitted. In 1928 Reidmuller described this serious venereal disease in animals and in 1932 Abelein authentically showed that these protozoa were responsible for abortion and

other maladies. Excessive sexual overloading intensifies the virulence of this disease. The disease affects dairy cattle economically. Many forms of trichomonads are known and cattle are affected by T. foetus which is 10 to 25 microns long and is pear, round or spindle shaped with 3 long anterior flagella and one posterior; the tubular axostyle extends axially and is pointed at its posteseor end as a slender spine. It is stained with difficulty but can be cultivated artificially in (1) coagulated whole egg slants with defibrinated blood & Ringer's solution, (2) Loeffler's blood serum slants, (3) Liver Infusion agar or in, (4) Allantoic cavity of developing chick embryo in fertilised eggs.

In bulls the symptoms are not characteristic and the disease becomes a chronic subclinical infection of the genitals. There is preputial inflammation Rarely epididymis and vas deferens become involved. T. foetus are found in the prepuce, urethra and penis. In *cows* there occurs a well defined nodular vaginits (raspberry like roughness) with a muco-purulent discharge and the infection proceeds to the uterus causing endometritis, varying in severity from a mild purulent inflammation to a copious obstinate pyometra. There is no perimetritis or peritoneal adhesions. There is complete atony and characteristic marked paresis of uterus. In many cows there is a failure to conceive inspite of a large number of copulations or if there is, frequently it ends in abortion of a macerated foetus at 2 to 4 months. This macerating process primarily affects the foetal membranes and dissolves them, in sharp contrast to the sclerosis and calcification of the chorion in bacterial diseases of the uterus. A large quantity of thin yellowish flocculent pus accumulates in the uterus and it is nonfoetid but is teeming with T. foetus, in contrast to bacterial abortions. Some cows however may abort twice or thrice and later become immune and the disease may die out quickly. Control of this disease is by excluding of affected animals from coitus and from attempts at artificial insemination. Trichomoniasis in women has not been known to cause foetal deaths or abortion as in cattle.

(2) *Vesicular V. D.* (Coital exanthem, Genital pox). This is an acute, highly infectious venereal disease affecting cattle, horses and less frequently goats, sheep and swine, characterised by profuse vesicular eruptions on the genitalia and spread naturally by *coitus* only. The causative organism probably a virus, is believed to be a saprophyte which becomes pathogenic due to some known (sexual overload, lowered powers of resistance) or unknown factors. The incubation period is from 3 to 6 days. Onset is sudden and course rapid and benign. Small papules appear in abundance on the copulatory organs and vesicles containing yellowish lymph develop and rupture leaving behind ulcers that heal in 10 to 15 days with characteristic depressed and depigmented lesions. The eruptions may relapse in recurrent crops in some cases. The lesions in vulva and vagina cause muco-purulent discharge but there is no fever, and systemic or gonadal affection. Usually in the female there is recurrence in 2 to 3 weeks and in severe cases there may be chronic persistent vaginitis or metritis. Some hold that this disease can cause epizootic abortion.

(3) *Infectious Vaginits of Nodular or Granular V. D.* This disease is essentially universal in ruminants and swine. The incubation period is one day and genital catarrh is the initial symptom. In *bulls* the penis presents definite balanoposthitis with abundant nodular lesions and incrustations, which interferes with copulation. In *cows* granular or nodular elevations (1 to 2 mm) appears in the vulvar mucosa especially about the clitoris, giving it a mulberry appearance. There is a small amount of purulent discharge which dries up as crusts upon the vulvar tuft of hairs. In mild cases the nodules are transparent, look like vesicles and may be mistaken for vesicular V. D.; in severe cases they are numerous and in closely packed rows along the longitudinal folds of vulvar mucosa which is swollen and inflamed. The parts bleed on pressure, urination is painful. Some hold that virulent cases may cause sterility and abortion.

(4) *Epizootic Infertility* or bovine venereal vaginitis and epididymitis are chronic diseases of cattle, transmitted by coitus and believed to be of viral etiology. Incubation period is from 2 to 8 days. *In bulls* the characteristic lesion is epididymitis and at times orchitis leading to atrophy of testes. In *cows* there is vaginal discharge, diffuse reddened areas in the vaginal mucosa and cervix but no vesicles or ulcers. The disease lasts for a few weeks. Though most cows recover, 15 to 25% may become permanently sterile.

(5) *Vibrionic Abortion:* appears to be a true V D. transmitted by coitus or by artificial insemination with untreated infected semen. Sheep and goats also suffer from this. The causative organism is a gram negative aerobic spirillum-comma or S shaped with 1 or 2 flagellae. It is cultivable in bacto-thiol or brain heart infusion agar with 3% thiol medium. It does not ferment any sugar; it is catalase positive. It can be cultivated from the foetal membranes, cervico vaginal secretions or semen. Blood culture is unsatisfactory. Clinically no lesions are found in the *bulls* though they carry the vibrios in their sheaths. In *cows* the vibrios cause infertility and the number of services required per conception is increased; also embryonic deaths, abortions and placentitis are not uncommon. However the infection tends to die out in the cows but not in the bulls.

(6) *Brucellosis*: Bacillus abortus of Bang's disease is transmitted in ruminants by coicus but also at times by ingestion, penetration of skin or conjunctiva. Bulls do not transmit the disease mechanically though they themselves may be infected. The organism causes natural venereal infection in horses, sheep, dogs, deer and fowl. The clinical manifestations and lesions caused are protean. In *bulls* epididymitis and orchitis are caused while in *cows* served, the uterus and udder get affected leading to metritis, sterility or abortion after the 5th month.

(7) *Listerosis*: (Listeria Encephalitis) is an infectious disease caused by a small rod shaped gram positive bacillus (Listeria Monocytogenes) affecting cattle, sheep, goats and swine. Though usually the infection is by ingestion of infected material, inhalation, conjunctival contamination or mediate contagion through inanimate

objects it is also contracted venereally. In the last case it ends in abortion at later months of pregnancy. In other modes of infection meningo encephalitis and fatal septicaemia are caused.

(8) *Genital Tuberculosis*: Primary genital tuberculosis constitutes a coital peril to the herd sire when caused to copulate with a cow suffering from uterine or vulvar tuberculosis. The herd bull may develop penile tuberculosis involving the corpora cavernosa, c. spongiosum, urethra, sheath as well as the lymph nodes along the penis, which become enlarged and firm but not tender; however preputial tuberculosis is rare. Bulls with open lesions on glans or prepuce constitute a serious menace; those with tuberculous orchitis continued in service may cause uterine tuberculosis in cows; tuberculosis of cervix or vagina is rare.

(9) *Fibro Bapilloma of Povine Genitalia*: Certain papillomatous lesions occur in penis or vagina of cattle and are caused by the virus of bovine cutaneous papillomatosis. This disease may be venereally transmitted. Horses and dogs are also affected.

(10) *Contagious bovine pyelo nephritis*: Caused by Corynebacterium Renales may rarely be transmitted to cows through service by infected bulls. This disease is characterised by purulent inflammation of bladder, ureter and kidney.

Venereal Diseases of Horses

(B) *Dourine (Maladie de Coit)*: Dourine is a serious trypanosomal disease affecting horses, asses and other solidungulates, transmitted almost exclusively by venereal contact and rarely by other means. Blood sucking flies (Tabanidae) may act as carriers at times, while ruminants, carnivora and laboratory animals may be infected experimentally. This disease is equine syphilis but with many differences from that of human beings. The causative organism is Trypanosoma equiperdum (first discovered by Rouget in 1896) and it resembles that of Surra, being 25 to 35 microns long. The invasion occurs through intact mucosa. An infected male actively discharging the protozoa from urethra or even male acting as a physical carrier after serving an infected mare may transmit the disease. The organisms inhabit the urethra or vagina but disappear periodically so that only some matings result in infection. When the disease is severe the animal is not able to copulate and hence does not spread the same.

The manifestation of dourine are variable. Definite signs appear in 8 to 14 days on the external genitalia after exposure. In the *stallion* first there is oedema of the sheath, prepuce, urethral mucosa, penis and scrotum but pain and warmth are absent. A thin dirty muco purpulent urethral discharge in which trypanosomes are seen is present; penis is paralysed early. The early manifestations in *mares* are similar with oedema of vulva and clitoris, vulvar paralysis and discharge of dirty muco pus containing the protozoa. Ulcers or vesicles do not occur; frequent and painful urination is present. After some weeks, in many, generalised, raised, disc-plaques appear

on the skin. They are circular with abrupt borders (Dollar Plaque). Trypanosomes are seen in the early skin lesions but rarely in the blood. Then depigmentation occurs in the genital mucosa as well as elsewhere. The condition may improve but in severe cases the malady affects the spinal cord causing paralysis gradually especially of the posterior parts of the body, with straddling gait and ultimately emaciation and death.

(B) *Other Venereal Disease in horses* are vesicular V. D., epizootic viral abortion and Bang's disease that causes specific contagious abortion in mares. Streptococci genitalia cause catarrhal inflammation of cervix uterus leading to sterility or if conception occurs, to abortion or to neonatal disease in foals. Infection due to salmonella abortivo equina, though naturally due to ingestion of contamcnated food, may also be transmitted at the time of service. This infection leads to oedematous swelling of prepuce, epididymitis and in mares to abortions.

(C) *Genital Bursatte* (Summer sores) is however not transmitted by coitus, though lesions occur on external genitalia.

Venereal diseases of sheep and goats

Diseases such as *Nodular V. D.* of cattle occur in a mild form in sheep and goats too; *Vesicular V. D.* occurs less frequently, while *Listerosis* which is acquired venereally causes abortion as in cattle but in the 12th week of pregnancy. The vibrio *(Ovine Vibriosis)* and Tr. foetus do not invade the male genitals beyond the external parts and hence The ram is only a minor factor in transmission of these. Vibrio foetus in *goats* causes vibrionic abortion. *Salmonella abortus* though mainly transmitted through ingestion may also be conveyed venereally by infected rams and cause abortion. *Brucellosis* is not readily transmitted from rams to ewes during mating. Rams suffer from epididymitis and may become infertile, while in ewes abortion is caused.

Venereal diseases of pigs

Nodular V. D. occurs in swine too as in cattle but there are not great numbers of nodules or inflammation of vulvar mucosa or exudate. Vesicular V. D. occurs less frequently than in cattle or horses. Brucellosis is transmitted venereally as well as by ingestion of contaminated food. B. Suis causes tiny, firm nodules in the uterine mucosa as well as in the spleen, liver and lymph glands and abortion in the third month, or sterility or heavy piglet mortality in case of sows and orchitis in boars.

Venereal diseases in dogs

Canine Venereal Tumour (Venereal granuloma) also known as histiocytoma and transmissible sarcoma, is of historical interest as it was the first neoplasm to be successfully transplanted from one dog to another. It is a paradox among neoplasms and its nature is unknown. This specific malady of dogs is not seen among domestic animals. It is transmitted principally by coitus and rarely by other means and hence is unique in that a neoplasm spreads in nature venereally. The lesions occur

in the external genitalia affecting the prepuce, penis or vagina and vulva and rarely spreads to other areas such as face or shoulder. Few days later a foetid bloody genital discharge occurs and vulva or prepuce gets swollen and then greyish-red, sessile vegetations that bleed easily occur, get ulcerated and protruding malignant masses of varying sizes grow. They then spread to the inguinal lymphatics and other adjacent tissues. Sometimes they may shrink.

Rabbit Syphilis or Cuniculosis

In nature rabbits get infected venereally with Trepenoma Cuniculi, which morphologically resemble Tr. pallida of muman syphilis and which are related to them antigenically and serologically. This natural infection consists of superficial, scaly eroded lesions on genitals and perineum; metastatic lesions occur in the skin elsewhere and at mucocutaneous borders of eyes and mouth. Experimental intra testicular inoculation of rabbits with T. Cuniculi produces orchitis similar to that produced by Tr. pallida but is less extensive T. cuniculi inoculated into man experimentally does not infect him and cause syphilis.

Experimental studies in animals

(I) *Syphilis:* In nature Tr. pallida are confined to human hosts but experimentally they have proved infectious to monkey, mouse, rabbit and the hamster. Themonkey was the first animal to be successfully infected with Tr. pallida by Metchnicoff in 1903; further studies were undertaken by Neisser in 1911 and by Schobl in 1928 The early course parallels that of human beings but it is not known whether the monkeys develop the late complications. However the monkey is not considered suitable for experimental research. In rodents and mice Tr. pallida multiply slowly without producing any significant reaction or lesion but are demonstrable by subinoculation in rabbits. In recent years the hamster has been preferred for the maintenance of Tr. pertenue, the causative organism of yaws. Guinea pigs act in an intermediate fashion and hence are not useful for experimental purposes. The rabbit was first successfully infected with Tr. Pallida by Betrarelly in 1906 and ever since then it has been the principal animal for experimental study of syphilis. Our present knowledge of immunological principles in syphilis is based on the course of infection in the experimentally infected rabbits.

Rabbits can be infected experimentally with Tr. Pallida intratesticularly or subcutaneously via the skin of the scrotum or back or by inoculation into the anterior chamber of the eye or by the I. V. route. In the first case it develops an orchitis (Primary Syphiloma); Iter epididymis and spermatic cord get involved and secondary generalised erythematous and papular eruptions and ulcerative lesions occur; bone, periosteum and eyes get involved. The rabbits remain infected for the rest of their lives and Tr. Pallida can be demonstrated by subinoculation from infected lymph nodes, spleen and bone marrow. Later involvement of cardiovascular or nervous system has not been demonstrated.

(2) As far as *gonorrhoea* is concerned the gonococci affect human beings only and experimental or domestic animals are insusceptible. There is no natural gonococcal infection of the genito urinary tract in animals. (3) Tr. foetus affects domestic animals and this is the counter part of human trichomoniasis which is due to Tr. vaginalis. (4) Animals do not suffer from natural infection due to the L. G. V. virus or the donovania granulomatis of human donovanosis or the virus of herpes progenitalis. But the L. G. V. virus can be transmitted experimentally to monkey, mouse and guinea pig. The mouse can be infected intracerebrally causing meningo encephalitis. Similarly infection with D. N. A. virus of genital herpes can be transmitted to scarified rabbit's cornea in which vesicles appear in 2 to 3 days; at times some rabbits develop meningo encephalitis. Donovania granulomatis cannot be transferred to animals. The Papova virus of human condyloma acuminata are not readily transmissible to experimental animals. Tnus animals seem not to suffer from the veneral diseases of human beings, though experimentally they can be infected with their causative organisms.

In contrast to many genital affections venereally acquired that cause abortion or infertility in animals only 2 veneral diseases are responsible for them in human beings. Syphilis may cause late abortions in women and gummatous orchitis, if bilateral sterility leading to in men. Similarly *gonococcal infection* leading to bilateral salpingitis and epididymitis was found to be responsible for sterility in the past but such sequelae are rare nowadays.

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