Diagnosis | **Scrotal fecal (or rectoscrotal) fistula**

The rat had a rectoscrotal fistula (also known as a scrotal fecal fistula), which is an abnormal passage between the interior of the rectum and the scrotum. Spontaneous scrotal fecal fistula is a rare complication in human infants—only six cases have been reported[1–4]. There is one report of a scrotal fecal fistula in an adult[5]. All the human cases occurred in developing countries, which have fewer healthcare facilities compared to developed countries. The cause is a neglected inguinal hernia that leads to incarceration with subsequent strangulation and formation of a fecal fistula.

Rectoscrotal fistulas are a type of digestive-system fistula resulting from an aberrant passage that communicates between components of the digestive system or between any part of the digestive system and surrounding organs. In this rat, the rectum communicated with the scrotum. Feces accumulated between the tunica vaginalis (the serous membrane covering the testicles) and the scrotal skin to form an adjacent pouch (**Fig. 3**).

FIGURE 3 | Dissection of the scrotal sac of the rat in **Figure 1**. (**a**) About 50 g of feces was removed from inside the scrotal sac.

There are multiple types of digestive-system fistulas in rats, and their names indicate the organs that connect abnormally. In females, for example, the most commonly observed fistulas are the vesicovaginal[6], urethrovaginal[7], vesicocervicovaginal[8], rectovaginal[9], enterovaginal[10], and ureterovaginal[11]. In males, the most common are rectourethral[12] and perineal fistulas. To our knowledge, this is the first case of a rectoscrotal fistula reported in a rat. However, previous cases of this type of fistula, if any, may have been considered a rectoperineal fistula, given the close proximity of the scrotum and the perineal area in the male rat.

The cause of the fistula in this male rat is unknown. Fistulas can develop after trauma of the rectum, infections, or cancer. Preexisting rectal lesions may lead to the development of abscesses that can expand to the point of opening into a different organ. If the abscess does not heal properly, it may become a chronic wound. Various reports indicate that common signs of rectal fistulas include purulent discharge and drainage near the anus, and pain during defecation. In the case of this rat, we detected necrosis of adjacent scrotal skin and a foul odor coming from the retcoscrotal fistula during necropsy (**Fig. 4**). We speculate that the reason we did not observe a cutaneous opening from the fistula rupturing was because the elasticity of the scrotal skin facilitated the fistula's expansion with feces.

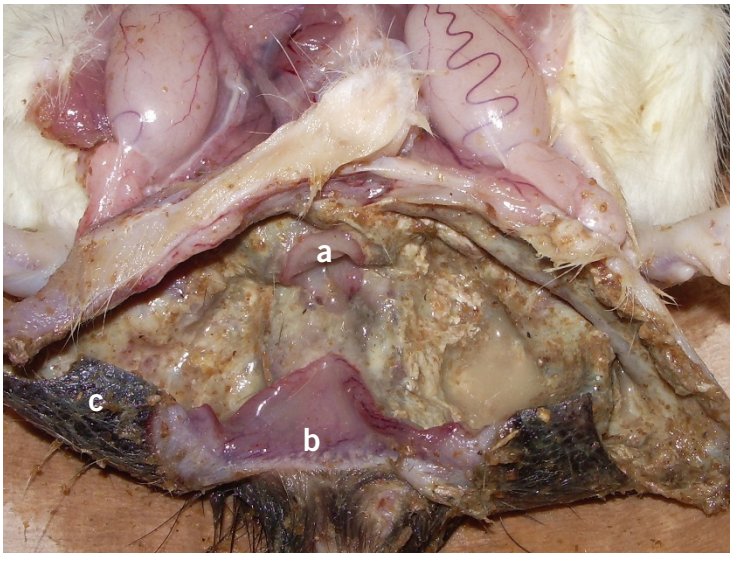

FIGURE 4 | Further dissection of the scrotal sac in **Figure 3**. (**a**) Lumen of the rectum (**b**) dissected anus showing mucosa and (**c**) scrotal skin covering the rectoscrotal fistula. The rectum is detached from the anus and there is necrosis of the scrotal skin that is contiguous with the retroscrotal fistula.

A fistula is commonly diagnosed when a probe can be passed between the communicating organs. In less obvious circumstances, imaging equipment may be needed. There was no opening on the skin surface of this rat, and thus this case would have been difficult to diagnose antemortem without imaging equipment.

Once a fistula has been diagnosed, surgical treatment may be required, including excision, debridement, fulguration, or cryosurgery[13–15]. Treatment may be complicated, depending to what extent the fistula has reached other organs. Treatment may also include laser light applied through a fiber optic strand to core out the fistula and minimize the damage to the surrounding tissue[16]. Malignant fistulas produced by tumors or ulcerative colitis have a poor prognosis, and when surgical removal is not possible, clinicians treat palliatively with fecal diversion or an endoluminal stent[10].

Digestive system fistulas in live animals require a multidisciplinary approach, diagnostic imaging for appropriate diagnosis, and complicated—often prolonged—treatment. In laboratory rats with digestive system fistulas, we recommend euthanasia.

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