Bloody Tears: Historical Review and Report of a New Case

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About dentition: In the seventh month, babies begin to develop teeth, which itching and pricking them as a splinter work their way through the gum. This provokes inflammation in the gums, jaw and tendons, and quite often fever. There is also inflammation in the acoustic duct, with wet ears. Some of them also have ophthalmia, and blood flows from their ocular canthi. (Translated from Greek.)
— Aëtius of Amida[1]

Because either blood or tears can be associated with peril,[2,3] the infrequent occurrence of bloody tears evokes interest and has sometimes been mentioned in old narrative writings. As Sophocles wrote in 430 BC, when King Oedipus discovered that he had unknowingly killed his father and married his mother, he, in guilt and misery, gouged out his own eyes, which poured blood.[4] In Euripides' version of this story, Polynices, a son of Oedipus, expressed his great sorrow by weeping bloody dark tears.[5]

When, during the Fourth Crusade, the Roman Christians conquered and sacked the Orthodox Christian Constantinople (1204), the exhausted crusaders "had an aspect similar to that of dead men. Their eyes were bloodshot for they shed more blood than tears."[6] The reason could be malnutrition, physical exhaustion, and/or epidemic infection.

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Figure 1. Dodonaeus.

The first mention of bloody tears that I found in a scientific medical book is in the sixth century *Aetius of Amida*,[1] quoted at the beginning of this paper. A millennium later, in the sixteenth century, Brassavola cited a nun who instead of menstruating had ocular and auricular hemorrhages every month.[7] In 1581, Dodonaeus (Figure 1) briefly cited the case of a pubescent 16-year-old girl "who discharged her flow throughout the eyes, as drops of bloody tears, instead of through the uterus."[8]

Citations of bloody tears in the seventeenth and eighteenth centuries are scarce and brief.[9-19] Hoffmann (1730) did not specifically mention bloody tears, but he wrote that "sometimes unusual and contra natura excretion of the acrid saline serosity goes out through different parts of the body… as through the glands of the eyes."[20] I found 31 nineteenth century publications relevant to bloody tears.[21-51]

I. CLASSIFICATION OF BLOODY TEARS

Bloody tears can be classified according to the anatomical source of the blood and to the etiopathogenesis of the bleeding.

A. Source of the Blood

Blood mixed with tear in the lacrimal basin may come from the tear glands, from the walls of the lacrimal basin, or from the puncta lacrimalia.

1. Tear Glands

There are three types of dacryoglands (aqueo-serous, mucinic, and lipid). The blood of bloody tears is commonly thought to come from the aqueo-serous lacrimal glands. Even scientific authors, when a specific source of the bloody tears has not been identified, may assume that the blood comes from the aqueo-serous *main* lacrimal glands[32,52,53] or from the *accessory* lacrimal glands.[54] Attributing the origin of the blood to the conjunctival goblet cells or the meibomian glands is unusual.[54-56]

2. Walls of the Lacrimal Basin

The lacrimal basin is the space between the surfocular tissues (conjunctiva and cornea), the posterior surface of the lids, and the lid rims. Some authors believe that the blood that mixes with the tear in the lacrimal basin is not produced by exudative sanguineous secretion of the lacrimal glands, but by a superficial hemorrhage of the conjunctival vessels.[57]

Hemorrhages of the conjunctiva and the tissues it covers are common. They may be caused by foreign bodies, surgical or traumatic mechanical damage to the conjunctiva, eyeball or orbit, conjunctivitis, conjunctival ulcers, telangiectasias, hemangiomas, pathological vasodilation, conjunctival varices, tumors, or vicarious menstruation. Subconjunctival hemorrhages (hyposphagma) are more frequent than spontaneous bloody tears, even though the superficial conjunctival vessels are more subject to the stress of rubbing and other external forces than are the subconjunctival and episcleral vessels. Subconjunctival hemorrhage usually does not produce visible bloody tears, but only occult erythrocyte deposits in the tear fluid.

The lid rim has been very rarely suggested as a possible source of bloody tears, as in a case of blepharoconjunctivitis[54] and in a case of blepharitis associated with crab lice parasitic infestation.[55]

Bloody sweat is another infrequent phenomenon of interest and has been discussed along with bloody tears.[24] In 1869 and 1871, Sous published a case of a 9-year-old girl who had recurrent bloody tears coming from the perspiration of about 1 cm^2 of the skin located over and between the lacrimal sac and the medial canthus of the left eye. This skin appeared normal, but for several minutes produced a bloody sweat, which passed to the caruncle and lacrimal basin, staining the tear. This phenomenon lasted only a few minutes and occurred every so often during the day or the night. After about 3 months, the origin of the blood was determined, the affected skin was painted with iron perchloride solution, and after 8 days with episodes of bloody sweat, the phenomenon ceased. The girl had not yet reached menarche.[33, 34]

The orbit and eyeball have occasionally been the source of bloody tears, which passed through conjunctival wounds to the lacrimal basin, as in rare cases of hemangiomas, epibulbar tumors, ocular surgery, scleral bucklings, and cranial surgery. Cerebrospinal fluid can mix with blood in the lacrimal basin following trauma to the roof of the orbit, but this is unusual.

3. Lacrimal Punctum

Blood emerging through the lacrimal punctum may have been extravasated from the walls of the lacrimal pathways. However, it most frequently comes from a nasal epistaxis, and the blood passes through the Hasner-Bianchi valve, enters the lacrimonasal duct, and, following an antidromic direction to the normal tear, emerges in the lacrimal basin through the lacrimal punctum. The most frequent origins of blood emerging from the lacrimal punctum is epistaxis produced by general vascular and sanguineous diseases or rhinitis. It may also be produced by tumors, foreign bodies, or contusive traumas. Rarely, it may come from the trachea or upper digestive tract.

When the blood comes from a hemorrhage in the nose, it, rarely, goes up spontaneously through the lacrimal pathways and emerges through the lacrimal punctum; this abnormal directional flow could occur when the epistaxis is treated with nasal tamponade, allowing the blood in the nasal fossae to ascend through the lacrimal pathways.[58-61] Usually, the punctal outflow of blood is slow, but Arnal cited a patient with epistaxis who for several minutes after nasal tamponade presented a jet of blood through both lacrimal puncta of the right eye.[22] Wiese presented a curious case of epistaxis in a female who, when she pinched or blew her nose, had blood come out from her right eye and ear (she had longstanding perforation of both tympanic membranes).[62]

When the blood appears through the lacrimal punctum without nasal tamponade, it is thought that it does not come from an epistaxis, but that it is extravasated in the lacrimal pathways. There are exceptions, such as a patient who had bloody tears after epistaxis without nasal tamponade.[63] In another case, the hemorrhage through the punctum lasted longer than the epistaxis, which may suggest that the hemorrhage originated in the lacrimal pathways.[38] In the case of a 78-year-old man with normal blood pressure and without previous history of epiphora, blood flowed through the lower punctum of the left eye intermittently over 7 days; digital pressure over the sac at first increased the bleeding from the lower punctum, but after a few minutes, the bleeding stopped and did not recur.[64]

When the blood comes from the lacrimal pathways or from an epistaxis and flows into the lacrimal basin, it most frequently exits through the lower punctum,[60,64,65] sometimes through both the lower and upper puncta,[22,65,66] and, rarely, through the upper punctum only.[67]

B. Etiopathogenesis of Bleeding

1. Hematologic Disease

In 1887, Schmidt-Rimpler reported a case of bloody tears after mild conjunctival trauma in a patient with hemophilia.[41] At that time, clotting factors of the blood were not yet determined, but the patient probably had deficiencies of clotting factors VIII or IX. Additional cases have since been published,[68] including that of a suckling 3-month-old baby with bloody tears who had a congenital deficiency of factor VII, the blood protein that initiates the coagulation cascade.[69] Bloody tears have also been reported in patients with anemia.[23,45,70]

Jaundice (icterus), which is produced by bilirubin, a byproduct of old erythrocytes, was associated with bloody tears more than three centuries ago by Forestus[11] and Havers.[15] Abboud reported a patient who had jaundice 1 year before having bloody tears.[70]

2. Vascular Diseases

Arterial high blood pressure is a frequent cause of epistaxis. Messner reported a case of a 72-year-old woman with high blood pressure-related epistaxis, who, after nasal cotton wool tamponade, bled through the lower lacrimal punctum.[60] Banta reported the case of a 49-year-old woman with arterial high blood pressure and posterior epistaxis, who, after nasal tamponade, suffered sanguineous epiphora

of the right eye, with blood coming from the upper and lower puncta.[65]

Hippocrates said that very red eyes were prone to hemorrhages.[71] Vasodilation of the conjunctival vessels of pathological origin was described in a patient who had a cerebellar artery occlusion that sometimes produced paralysis of the sympathetic nerve and vasodilation on the side of the lesion. On these occasions, a slight abrasion of the conjunctiva resulted in a filtration of blood that produced bloody tears.[72]

In the case of a 16-year-old girl with occasional hemorrhages in the left eye, the only finding in the conjunctival biopsy was the presence of a more abundant than usual vascular plexus, with some varicose dilated vessels.[73] Its relation with the bloody tears was not demonstrated.

Bloody tears have been reported to occur with use of the mecholyl test to investigate autonomic imbalance in psychiatric patients.[74] This test involves the subcutaneous injection of 10 mg of methacholine, which provokes peripheral vasodilation and hypotensive systolic blood pressure. It is also used as a diagnostic test in achalasia and other diseases.

In 1885, De la Peña reported an interesting case of a 20-year-old woman who had had normal menstruation from the age of 13 years.[39] One day she had superciliary pain in the left eye, followed by bloody tears in this eye when the pain disappeared. The phenomenon recurred 3-4 times a day. Conjunctival examination was normal. One day the skin of her whole body was covered with small red dots, which were diagnosed as purpura. After that, the bloody tears did not recur.

Blood-stained tears have been reported secondary to conjunctival hemorrhages in a patient with Henoch-Schönlein purpura,[75] and subconjunctival hemorrhage and bloody tears have been reported in a patient with thrombocytopenic purpura.[76] Kumar reported thrombocytopenic purpura with an episode of epistaxis and bloody tears in a 6-month-old male.[77] He had multiple petechiae in the skin of his body and some bleeding sores on the lips. It was not clear if the bloody tears came from the eye or the nose or both.

Gardner-Diamond purpuric ecchymotic syndrome has been associated with bloody tears.[78,79]

Telangiectasia, a spider's web of superficial capillaries and arterioles, when in the conjunctiva can produce bloody tears. Sometimes it is associated with hereditary autosomic Rendu-Osler-Weber disease. Micas described a 12-year-old boy who had bloody tears in the tarsal conjunctiva several times a day for 3 months.[80] He sometimes had epistaxis and bleeding from purpuric patches on the tongue and buccal mucosa, and his mother had similar patches on the lips and tongue. Possibly, this was a case of Rendu-Osler-Weber disease.

Clear familial cases of Rendu-Osler-Weber disease were published by Wolper et al[81] and Brant et al,[82] who described patients with intermittently sanguineous tears due to conjunctival telengiectasis. Other cases involved a 63-year-old man with familial telangiectasis sometimes associated with gastrointestinal bleeding,[83] a 56-year-old woman with conjunctival, gastrointestinal and other mucosal telangiectasias,[84] and a 45-year-old woman with Rendu-Osler-Weber disease who had repeated epistaxis and gastric hemorrhages.[85]

Venous varices or distension have been associated with bloody tears. In one case, a16-year-old girl with some conjunctival varicose vessels had episodes of bloody tears in the left eye, which sometimes coincided with her menstruation.[73] In another report, a woman had a varix of angular veins associated with hypocoagulation, and on compressing the jugular vein, blood appeared in the medial conjunctiva and lid skin.[86] Another case involved hemorrhage by rupture of a vessel of a cystic distended lacrimal sac.[87] Bloody tears associated with Roger's disease has also been reported.[88]

3. Inflammatory Disease

Inflammatory mediators in body tissues can be produced by various factors, most frequently infections or chronic mechanical irritation. Lundh et al determined that the blood-tear barrier limits the IgG and albumin levels in normal tear to 3 and 23 mg/l, but that the permeability of the barrier increases with local eye inflammation, contact lens wear, foreign bodies, or mechanical irritation, and consequently the serum flow increases the tear levels of serum hematic proteins.[89] The passage of red corpuscles from the blood to the tear may be the result of a great increase of the permeability of the barrier blood/tear (resulting in occult hemolacria) or to a rupture of the histological structure of the blood vessels that allows the passage of the erythrocytes, whose normal diameter is 6-8 micrometers, to the extravascular tissues, and then to the lacrimal gland acinar tubuli or to the lacrimal basin. Many red blood cells would be required to color the tear fluid with their hemoglobin pigment. Therefore, it is considered that real bloody tears are produced by a real hemorrhage in a part of the body connected to the lacrimal system.

It has been noted that the mecholyl test, besides producing vasodilation, can produce an inflammatory effect in the lacrimal glands, which increases the possibility of bloody tears.[74]

A number of reports support the association of bloody tears with inflammatory conditions. Cazelles cited an 8-year-old boy, who some days after having an exanthematic fever presented hemorrhages through the mouth, nose and eyes for 24 hours; he then had ophthalmia for the following 7 years, with blood coming out from the medial canthi of the eyes.[19] Bloody tears have also been associated with dacryoadenitis of the lacrimal glands,[32,52] blepharitis concomitant with Pthirius pubis infection of the lids,[55] and repeated episodes of conjunctiva and lid rim vasodilation.[54] Various clinical forms of conjunctivitis have been reported with bloody tears, including follicular conjunctivitis with congested caruncular and semilunar fold,[45] papillary conjunctivitis in the tarsal conjunctiva,[80] giant papillary conjunctivitis,[90] conjunctival granulation or ulceration, [68,91] and tuberculo-

sis, with or without an association with intravitreal hemorrhage.[92]

Inflammatory papilloma of the conjunctival sac was diagnosed in a 14-year-old boy who bled from his left eye.[93] The title of the article describing this case erroneously refers to "lacrimal sac" instead of "conjunctival sac," which has caused some confusion.[64,94] Episcleritis with bloody tears has been reported in a case of postoperative scleral buckle infection.[95] Rhinitis of different origins has been mentioned in the discussion of epistaxis.

4. Medications

The installation of silver nitrate into the conjunctival basin of newborns to prevent ophthalmia neonatorum has been occasionally followed by surfocular bleeding, sometimes with risk of death.[47,50,96-99]

In a case reported in 1891, a 21-year-old woman used a prescribed lotion to treat follicular conjunctivitis, and for more than one year, she had episodes of bloody tears; the only visible manifestation was congestion of the caruncle and plica semilunaris.[45]

Acetylcholine has also been reported to caused bloody tears .[55]

5. Trauma

A 1637 report describes a man, who for 2 days after being struck by lightning, had effusion of blood from the angles of the eyes, without local redness or pain.[12] A similar trauma followed by bloody tears was reported in 1952.[99]

Bloody tears have been reported with conjunctival trauma resulting from a subconjunctival metalic splinter[101] and other foreign bodies.[102] An unusual case involved the voluntary introduction by the patient herself of a cinnamon bark covered with gauze into her left upper conjunctival fornix.[103]

Surgical traumas sometimes produce postoperative bleeding in the lacrimal basin, but they are usually not reported, as they may be considered a normal surgical event. Bloody tears have been reported after treatment of trachomatous follicles by expression[91,104] and postoperative scleral buckle infection.[95] Bloody tears with post-traumatic epilepsy[53] and following cranial trauma[105-107] have also been reported.

Cases in which the trauma causes the outflow of cerebrospinal fluid to the conjunctival basin or to the nasal fossa are unusual. A curious case, but without bloody tears, is that reported by Dryden et al of a naso-orbital injury that produced a chronic fistula and outflow of cerebrospinal fluid through the roof of the orbit, simulating a chronic tearing.[108]

I have investigated the connection between the intracranial subdural space over the orbital roof of the frontal bone and the upper conjunctival fornix in a *Macaca sylvanus* monkey, attempting to transmit cerebrospinal fluid through the transosteal implantation of a silicone valve between the subdural space and the conjunctival upper fornix; the animal had occasional bloody secretion (apparently, bloody tears), until the valve spontaneously extruded 6 days later.[109]

Nasal bone fracture[110,111] and Le-fort-I facial fracture[112] have produced epistaxis and retrograde blood flow emerging through the lacrimal puncta.

6. Physical Exertion

Physical exertion, sometimes just stooping and bending, has been cited as a cause of bloody tears.[29,36,43] Vigorous crying can cause bloody tears. In 1679, Seger described a milk-fed girl who wept bloody tears from her eyelid canthi; she was cured with a collyrium of rose water.[14] In 1755, Raigerus several times observed drops of bloody tears in a normal suckling 15-16-month-old child.[18] The eyes were normal, and Raigerus suspected the bloody tears could be due to the breakage of some capillary vessels in the angle of the eye when the child cried in anger. (Raigerus mentioned four previous observations in other books.) More recently (1935), Minchin cited a similar case of bloody tears in a 3½-year old child who for three months cried blood and not tears.[113]

Coughing has also been noted to be a cause of bloody tears. In one reported case, an episode of coughing provoked epistaxis, followed by release of blood through the lacrimal pathways without nasal tamponade.[38] In another case, cough and nasal congestion was considered a possible cause of bloody tears in a 6-month-old child.[77]

A curious phenomenon mentioned here only anecdotally does not exist in humans but in the lizard horned toad (*Phrynosoma coronatum*), which lives in the USA and Mexico. When it is attacked, the arterioles and capillaries of its ocular surface and nose congest and break. A fine spout of blood as much as 1 meter long shoots out from its eyes against the attacker.

7. Neoplasms

Hemangioma of the tear glands and conjunctiva can cause bloody tears.[56] Conjunctival hemangiomas are more frequent. They may be flat or pedunculated,[48,114,115] and may occur in the conjunctival or episcleral upper fornix,[116,117] upper lid,[56,118] inner angle,[119] or lower fornix.[120] Frequent shedding of bloody tears was reported to occur in a case of bilateral and symmetrical capillary hemangiomas attached to the upper orbital margin and under the orbital roof of both eyes.[121]

Bloody tears have been reported with meningioma in the lacrimal sac[66,122,123] and with lymphangioma in the upper cul-de-sac.[116] Melanoma associated with bloody tears has been reported in the lacrimal basin[49,124-127] and in the lacrimal sac.[128]

8. Menstruation

Bloody tears in females sometimes occur during menstruation, and have been termed "vicarious menstruation." In most cases, the phenomenon occurs at menarche or soon thereafter, and more rarely, during reproductive maturity or in climacterium and menopause.

Vicarious menstruation may be caused by bleeding into the lacrimal basin of aberrant ectopic endometrial tissue[68,107,129] or previously normal tissues stimulated by hormonal or parahormonal factors,[129] or in relation with estrogenic premenstrual light blood hypertension.[130]

Aberrant microendometriosis or the bleeding response of nonaberrant tissues to the menstrual stimuli may reside in tissues outside the uterus (eg, nipple, rectum, stomach, umbilicus, lungs, lips, nose, ears, external eye, retina). Extrauterine bleeding can occur with apparently normal uterine bleeding with altered or defective menstruation or without menstruation. In any case, the vicarious hemorrhage in the eye may provoke bloody tears.[25,26,27,42,73,131-137] Sometimes the bleeding is subconjunctival without bloody tears.[138]

Vicarious menstruation bloody tears may have a periodicity similar to the menstrual cycle, which facilitates the diagnosis.[52] However, they may also have irregular cyclic and temporal manifestations, making it dubious whether the bloody tears are or are not included in the phenomenon of the vicarious menstruation.[70]

Occurrence in Young Girls: Usually the bloody tears of vicarious menstruation occur without pain or feeling of abnormality, last several seconds or minutes, may occur several times during the day, and affect one or both eyes, simultaneously or alternatively. The bleeding, if sparse, is noticed when drying the tears with the handkerchief or when looking into a mirror. When bleeding is abundant, it overflows onto the cheek. There are many variants.[102]

The first identified case of bloody tears with vicarious menstruation, to my knowledge, was the case Dodonaeus reported in 1581 of a girl who at the age of 16 had not yet menstruated and had sanguineous tears.[8] Hasner reported the case of a 13-year-old girl whose eyes bled during the 6 months preceding menarche, sometimes in the right, sometimes in the left, and sometimes in both eyes.[32] The bloody tears, which Hasner thought came from the lacrimal glands, lasted a few seconds. Déjean cited a case of bloody tears ceasing with the first menstruation.[139] Wallis reported two patients with bloody tears. One, a 12-year-old girl, bled spontaneously from the episclera and conjunctiva of the lower fornix, and the author related this to menstruation.[120] Gabriélides presented a 14-year-old girl who first menstruated at 13 years old, had three more cycles at intervals of 20-30 days, and then stopped.[54] After 4 months without menstruation, bloody tears appeared several times every day in the right eye. One of the episodes occurred in the doctor's office. The bulbar and culde-sac conjunctiva had vasodilation, and a score of small hemorrhagic dots were present over the conjunctiva of the upper border of the tarsus, where the Wolfring-Ciaccio accessory lacrimal glands are aligned. Some moments later, all was normal. Van der Viel mentioned the case of a girl whose menstruations ceased, and she then began to have bloody tears.[30] Abboud was able to observe at the slitlamp the eye of a 17-year-old girl while it was bleeding. The conjunctiva was white, with no evidence of congested vessels, and the whole conjunctiva was oozing blood.[70] Barat also described vicarious menstruation of the conjunctiva in a 17-year-old girl.[140]

Occurrence in Mature and Older Women: In mature women, recurrent bloody tears during or instead of menstruation is rarer than in young girls. The first cited case was in 1541 by Brassavola, who described a Sister of Charity (nun), who instead of menstruating had bloody tears and bloody ears.[7] Vicarious menstruation has been reported during climacterium and menopause.[139,141,142] One case occurred after hysterectomy.[143]

In pregnancy and early lactation, menstruation stops. Ottavay et al used the stix test to assess conjunctival fluid for the presence or absence of occult hemolacria in 125 healthy subjects: occult hemolacria was observed in no more than 7% of the 30 pregnant women and in none of the 7 menopausal women. Among the 24 males they studied, occult hemolacria was noticed in 8%. They deduced that occult hemolacria in fertile women seems to be induced by hormones.[144]

9. Psychogenic Influences

Emotion and stress have sometimes been cited as a cause of bloody tears. Bloody tears have been reported in a woman after a fright (which also resulted in cessation of menstruation),[28] in a young girl when she got angry or when she finished menstruating,[30] and in a young girl under the stress of studying for house examinations.[104]

Lanzonus (1738) reported a young man whose eyes, in the absence of physical activity or other possible causative circumstances, became red and his tears bloody when he wept.[17] Calla published a case of bloody tears associated with stress, anxiety, and hypoprothrombinemia,[145] and Muci-Mendoza[78] and Wainshtok[79] noted an association of bloody tears with psychological stress in their patients with Gardner-Diamond syndrome.

Bloody tears associated with emotional suffering have sometimes been reproduced in paintings and statues. Interestingly, Palmirotta et al used polymerase chain reaction to analyze the dried bloody tears of an Italian statue of the Virgin Mary and identified them as real blood of human female origin.[146]

Hysteria, so-named because it is more frequent in women (from Greek *hystéra, ὑστέρα* = uterus), has been associated with bloody tears.[29,35,57,101,104,147]

Imbalance of the neurovegetative system after gross disturbance of the autonomic nervous regulation has been reported.[55,104,106,132] Other cases that may have this association have also been noted.[101,148]

Mysticism or allegoric spirituality has been associated with bloody tears. Rémond cited a case of hemorrhages in the eyes, ears, and palms, which disappeared with hypnotic sleep.[44] Teresa von Konnersreuth wept tears of blood during ecstacy on Good Friday.[147]

10. Simulated Bloody Tears

Spurious or malingering bloody tears have sometimes been produced. Kalt noted that the hysteric personality has a predisposition to simulation and self-inducement of conjunctival trauma and bloody tears.[149] Reported cases include those of a 16-year-old girl who used food coloring to simulate blood in tears,[150] a hysteric female who pricked her finger with a needle and drew her hand across her

eye,[10] and a 25-year-old woman who produced conjunctival discharge by inserting a gauze-covered cinnamon bark into her upper fornix. Splleers in 1907 presented the case of a hysteric woman with green membranous conjunctivitis and green tears.[151] The membranes were transferred to the conjunctival sac of a rabbit, which after some days also had green tears. The patient was closely watched, and one day she was observed putting pieces of copper sulphate crystals into the eye of the rabbit. Although this does not represent a case of bloody tears, it is an interesting case that illustrates the concern caused by colored tears.

11. Unknown Causes

Some cases of bloody tears have no proven etiology.[53,54,132,152-157] As an example, I mention the report of Gabriélides, who presented a 36-year-old female with four children, a widow for 4 years, who shed bloody tears from either or both eyes.[54] The bloody tears lasted from a few seconds to 1 hour, and they recurred in 3, 5, 10, 25 or 45 days. The episodes had no evident relation with menstruation, which was maintained with small irregularities; she occasionally had buccal hemorrhages. When examined during an episode of bloody tears, the patient had normal lacrimal glands and conjunctiva.

II. A NEW CASE OF BLOODY TEARS

Two decades ago, a 13-year-old girl from the small Andalousian town of La Carolina in the south of Spain developed, simultaneously and symmetrically, two light brown cutaneous spots in the skin of the medial half of both lower lids. They disappeared in 1 week. Some days later, both cutaneous dots recurred but with a diffuse perspiration, followed for 1-2 minutes by simultaneous "sweating of blood" from the skin that stained her handkerchief and coagulated on the skin. The cutaneous brown dots persisted for several days, with an anomalous density of capillary vessels in the affected skin, but without bleeding.

A few weeks later, a boy was killed in an accident, and his schoolmates were extremely upset. The young girl and other schoolmates went to his burial, which took place on a Wednesday. While in the cemetery, the girl began to weep with bloody tears, which the schoolmates associated with a miracle or something supernatural. The following Wednesday, she again had bloody tears for several minutes. Over the following 6 months, the girl had 16 episodes of bloody tearing, usually in both eyes and most often on a Wednesday, with no apparent relationship with the menstrual phase.

I saw the girl at the Hospital in Madrid when she was 14 years old. Her medical history reported only measles, varicella, and mumps between the age of 6 and 9 years. There was no history of conjunctivis, dermatitis, trauma or other diseases (including hereditary diseases), epistaxis, or other unusual bleeding. Menarche had presented 1 year before, but was irregular in interval, duration, and intensity of bleeding. Since the first episode of bloody tears, the girl had been under psychological stress both at school and in the town.

My ophthalmological examination showed normal lids except for a slight darkness in the skin of the medial half of the lower lids. There was no blepharitis. The aspect of the episcleral conjunctival vessel was normal, as was the redness of the conjunctival fornices and tarsal conjunctivas. There were no papillomata or other pathologies and no fluorescein or rose bengal surfocular staining. Schirmer-I test was normal, and lacrimal pathways were permeable. Tear taken with a capillary tube from the lacrimal cistern and examined on a glass smear under the microscope revealed some red corpuscles. Extrinsic and intrinsic ocular motility, fundus oculi, visual field, refractometry, visual acuity, and intraocular pressure were normal.

The patient's behavior was normal until we began to discuss her condition. She became distressed when questioned, ceased cooperating, and began to weep bloody tears. Tears came from both eyes, but not from the skin of the lower lids, whose color became a little darker. I tried to reexamine the conjunctival fornices, but the emotional state of the girl impeded a satisfactory examination. The bloody tears stopped after 6-8 minutes. Unfortunately, the girl's emotional state prevented any further examination, other than taking the picture shown in Figure 2.

Figure 2. Bloody tears shed by a 14-year-old girl during ophthalmic examination.

Blood analysis performed the next day in her town showed: red cells 4.560.000, leukocytes 6,300 (0, 1, 0, 43, 53, 3), platelets 225.000, coagulation time 8 minutes, prothrombin time 11 seconds, globular sedimentation time 20 seconds. My diagnosis to her family doctor was a probable hysterical reaction with a possible endocrine menarchial relationship, but without apparent danger to the ocular apparatus.

I contacted the patient years later and learned that the bloody tears had lasted for 5-6 more years, but with less frequent episodes. Her menstruation was irregular until she had three children in her 20's, after which it became regular and normal.

III. TERMINOLOGY

A. Visible Bloody Tears

Bloody tears is the simplest and most commonly used term to describe the presence of blood in the flow of tears. Scientists are more precise. Micas specified that bloody tears refers to the secretion of blood from the lacrimal gland, and not the mixing of ordinary tears with blood in the lacrimal surfocular basin.[80]

Scott [53] and Vila Ortiz[153] wrote that "the terms sanguineous lacrimation and bloody tears are frequently used synonymously, which is a mistake."

New terms have since appeared in the medical literature to describe the mixing of blood with tear in the ocular surface: sanguineous lacrimation,[53] sanguineous tears,[107] bloodstained tears,[75] lacrimae cruentae,[65] haemolacria[62,144,158] or hemolacria,[95,112] hemolacrimia,[78,79] hemolacrimation,[78] hematic epiphora,[85] hematodacryorrhea,[159] dacryohemorrhea,[160,161] and dacryohemorrhysis.[66,116] The most frequently used term in all languages is the equivalent of "bloody tears" or "tears of blood."[162,163]

B. Occult Hemolacria

Another term and concept is "occult haemolacria."[144,158] If the volume of blood cells in tears is small, a change in the color of the tears may not be visible to the naked eye. Norn noted that "microscopy has been found to disclose occult blood in 13% of normals (≥100 erythrocites/3.1 mm^2), while the chemical method discloses the presence of haemoglobin and its breakdown products derived from erythocytes in 3%."[158] When erythrocytes are demonstrated by microscopy or chemical analysis in apparently transparent tears, the condition has been termed "occult hemolacria."[144,158] Occult hemolacria is frequent in contact lens users and in patients with severe anemia, coagulopathies, conjunctivitis, hyposphagmas, ciliary congestion, surfocular allergy, and many other conditions.

C. False Bloody Tears

Colored tears of various hues are sometimes suspected to be bloody tears, but the color may have other origins. For instance, in the laboratory setting, "chromodacryorrhea" was seen to occur with the the injection of adequate amounts of muscarinic drugs into rats, causing opaque reddish-brown tears. These were due to the presence of a substance later identified as protoporphyrin and coproporphyrin, which are secreted by the Harderian gland[164,165] and were not due to blood.[166-168] "Black tears," also termed "melanodacryorrhea," have been reported in a necrotic uveal melanoma[169] and in both eyes of a patient with argyrosis of the conjunctiva.[159]

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