Table S1. Summary of 126 reports on pneumoparotid.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author** | **Age** | **Sex** | **Side** | **Duration** | **Chief complaint** | **Other symptoms** | **Past history** | **Crepitus** | **Air bubbles** | **Diagnostic imaging** | **Findings** | **Etiology** | **Group** | **Treatment** | **Resolution** | **Relapse** | **Follow-up** |
| Deichmüller 1890 [1] | 19 | m | bi | 5 weeks | swelling | - | - | + | NR | - | - | glass blowing | glass blowing | punction | + | - | NR |
| Scheele 1900 [2] | 31 | m | bi | NR | recurrent swelling | otalgia, dizziness | epilepsy, measles, scarlet fever | + | + | - | - | glass blowing | glass blowing | NR | NR | NR | NR |
| 42 | m | bi | NR | recurrent swelling | NR | NR | NR | NR | - | - | glass blowing | glass blowing | NR | NR | NR | NR |
| Scheier 1907 [3] | 30 | m | bi | 15 years | recurrent swelling, pain | pus discharge | larynx catarrh | + | + | - | - | glass blowing | glass blowing | NR | NR | NR | NR |
| 28 | m | bi | 13 years | recurrent swelling | - | NR | NR | + | - | - | glass blowing | glass blowing | NR | NR | NR | NR |
| 21 | m | r | NR | recurrent swelling | NR | NR | NR | NR | - | - | glass blowing | glass blowing | NR | NR | NR | NR |
| 37 | m | bi | NR | recurrent swelling | NR | NR | NR | NR | - | - | glass blowing | glass blowing | NR | NR | NR | NR |
| 39 | m | l | 5 years | recurrent swelling | pus discharge | NR | + | + | - | - | glass blowing | glass blowing | NR | NR | NR | NR |
| 37 | m | NR | NR | recurrent swelling | NR | NR | NR | NR | - | - | glass blowing | glass blowing | NR | NR | NR | NR |
| Narath 1912 [4] | 42 | m | r | 8–9 years | recurrent swelling | chronic stomatitis, pharyngitis | arteriosclerosis | + | NR | - | - | glass blowing | glass blowing | rerouting | + | + | several years |
| Gaus 1941 [5] | 23 | m | bi | 9 years | recurrent swelling | - | mumps | NR | + | radiography | enormous enlargement and part of the Stensen's duct | trumpet | wind instruments | NR | NR | NR | NR |
| Rysenaer et al. 1963 [6] | 13 | w | r | NR | recurrent swelling, pain | emphysema in the right face and neck | NR | NR | NR | - | - | nervous tic, self-induced | self-induced | antibiotics | 2 weeks | + | NR |
| NR | w | bi | NR | swelling, unpleasant tension, pain | NR | mumps | - | - | sialography | normal | nervous tic | diseases | advice not to repeat tic | several days | NR | NR |
| Rupp 1963 [7] | 11 | m | bi | short time | recurrent swelling | - | NR | + | + | radiography, sialography | a definite distortion of the arboreal ductal pattern by many cyst-like air spaces | blowing very strongly with the back of the hand occluding the mouth | self-induced | observation | 36 hours | + | NR |
| Reitlinger 1964 [8] | 55 | m | r | 7 years | recurrent swelling, pain | Emphysema in the face and neck, sialolith | NR | NR | - | radiography, sialography | dilated duct, air sac | professional trumpet player | wind instruments | antibiotics, surgical incisions, sialolithiasis | + | NR | NR |
| Greisen 1968 [9] | 9 | m | bi | 6 months | recurrent swelling, pain | emphysema in the face and neck | mumps | + | + | radiography, sialography | air in the soft tissues of the left side of the neck and left parotid region; normal | holding the nose and mouth and then blowing with relaxed, inflated cheeks | self-induced | observation | + | + | 18 months |
| Yoel et al. 1970 [10] | 45 | m | bi | 7–8 months | swelling | nausea, vertigo | NR | NR | - | sialography | normal | siphoner | glass blowing | resigned from the siphoner job | + | - | 18 months |
| 54 | m | l | 2 months | swelling | - | NR | + | NR | sialography | enlargement of the parotid gland | air bubbles entering when blowing. | glass-blowing | sympathetic infiltrations and intraductal instillations | + | - | NR |
| 57 | m | r | NR | swelling, pain | - | NR | NR | + | radiography, sialography | atony of the buccinator muscles and slight inflammation | sneezing crisis | diseases | antibiotics | NR | NR | NR |
| Rosefsky 1970 [11] | 8 | m | bi | 7 hours | recurrent swelling, pain | NR | mumps, bacterial parotitis | - | - | radiography, sialography | normal | not only dislike of school but also fears about the distortion of and threats to body image | self-induced | psychiatric interviews, Bethanechol | + | - | NR |
| Calcaterra & Lowe 1973 [12] | 14 | m | l | 1 day | swelling, pain | subcutaneous emphysema over the left parotid gland, pneumomediastinum | mumps, behavioral problems | + | NR | radiography, fluoroscopy, sialography | subcutaneous emphysema over the left parotid gland | a habit of blowing out the cheeks when upset or disturbed; an adjustment reaction to adolescence | self-induced | antibiotics, psychological counseling | + | + | 9 months |
| Saunders 1973 [13] | NR | NR | NR | NR | recurrent swelling, pain | NR | NR | NR | NR | - | - | Trumpet | wind instruments | NR | NR | NR | NR |
| NR | NR | NR | NR | recurrent swelling, pain | NR | NR | NR | NR | - | - | Clarinet | wind instruments | NR | NR | NR | NR |
| NR | NR | NR | NR | recurrent swelling, pain | NR | NR | NR | NR | - | - | wind instrument | wind instruments | NR | NR | NR | NR |
| NR | NR | NR | NR | recurrent swelling, pain | NR | NR | NR | NR | - | - | having very forcefully blown up some heavy balloons | balloon | NR | NR | NR | NR |
| O’Hara & Keohane 1973 [14] | 19 | m | l | 6 months | recurrent swelling, fever | difficulty in breathing | tracheobronchitis, subcutaneous emphysema of the face and neck | + | + | radiography, sialography | a dilated branching ductal structure in the area of the parotid duct; marked dilatation of the parotid duct and evidence of chronic sialadenitis | swelling during sleeping | idiopathic | complete removal of the parotid gland | + | - | NR |
| Watt 1977 [15] | NR | m | r | NR | emphysema of the right side of the face | NR | xerostomia induced by anti-seasick tablets | NR | NR | sialography | dilated right main duct | inflating the parotid until infection supervened | self-induced | parotidectomy, psychiatric treatment | + | NR | NR |
| NR | m | NR | NR | swelling | NR | NR | NR | NR | - | - | decompression after diving | other | NR | NR | NR | NR |
| NR | m | NR | NR | recurrent swelling | NR | NR | NR | NR | - | - | watchkeeping in a compartment | other | NR | NR | NR | NR |
| NR | m | NR | NR | NR | NR | NR | NR | NR | - | - | bugler (horn) | wind instruments | NR | NR | NR | NR |
| Sanchez et al. 1980 [16] | 15 | w | bi | 2 years | recurrent swelling, dysphagia | emphysema in the face and neck | personality disorder | NR | NR | sialography | normal; irregularity of the Stensen's duct | self-injury into the Stensen's duct with pins | self-induced | antibiotics, massage | + | NR | NR |
| Hadas et al. 1982 [17] | 16 | m | bi | 2 years | recurrent swelling, pain | feeling of oppression | NR | NR | + | sialography, US, CT, radiography | air in the parotid glands | mental pathology | diseases | psychiatric counseling | + | NR | 6 months |
| Aristy 1982 [18] | 17 | m | r | suddenly | swelling | emphysema in the face and neck | asthmatic bronchitis | + | NR | radiography | air in the mandibular angle | asthmatic bronchitis and severe cough crisis | diseases | antibiotics | 3 days | NR | NR |
| Byard 1986 [19] | 9 | m | L | 3 weeks | painful recurrent swelling | - | aphthous ulcer | NR | NR | - | - | a habit of blowing out his left cheek with air for several minutes before meals in an attempt to stop aphthous ulcer pain while eating | abnormal habit | behavioral modification (discouraging cheek inflation) | + | - | 6 months |
| Garber 1987 [20] | 32 | m | bi | a few minutes | swelling, pain, and pressure when opening jaws | - | hay fever, seasonal allergies | + | - | - | - | forceful clearing of the nares during a hay fever attack | diseases | antibiotics, antihistamine-decongestant | 5 days | NR | NR |
| Markowitz-Spence et al. 1987 [21] | 12 | w | bi | 6 months | recurrent swelling | otalgia, foul taste, erythema of the overlying skin, masseter muscle hypertrophy | chronic obesity, gum chewing, psychosocial adjustment problems at school | NR | - | sialography, CT | air in the duct | Valsalva motion with clenching | self-induced | antibiotics | 1 day | + | lost |
| Komori et al. 1988 [22] | 45 | m | l | 3 years | recurrent swelling | - | diabetes mellitus, otitis media | + | + | US, CT | air in the bilateral glands and ducts | puffing out the cheeks strongly with his breath | abnormal habit | instruction to stop the abnormal habit | - | + | NR |
| David & Kanga 1988 [23] | 6.5 | w | l | 9 months | swelling | intermittently warm, erythematous, tender | cystic fibrosis | + | + | radiography, CT | loculated cystic dilation with several rounded gaseous latencies | habitually filling the left cheek with air and pressing on it forcefully with the fist, attempting to suppress frequent cough | abnormal habit | antibiotics, percutaneous evacuation, reinforcement to abolish the tic | + | - | NR |
| Brodie & Chole 1988 [24] | 14 | m | r | 1 year | recurrent swelling | subcutaneous emphysema in the right face | left maxillary fracture with massive subcutaneous emphysema on both sides of the face and neck | + | + | CT | the air throughout the duct and swelling of the gland with air | causing swelling by increasing intraoral pressure | self-induced | rerouting the parotid duct to the apex of the tonsillar fossa | NR | - | 3 years |
| Telfer & Irvine 1989 [25] | 29 | m | r | 2 years | squelching noise and feeling | - | - | + | + | radiography, US, sialography | dilating ducts containing air | idiopathic | idiopathic | lengthening and posteriorly repositioning of the duct by using a buried mucosal flap based on a periductal pedicle | + | - | 4 months |
| Yamashita et al. 1990 [26] | 40 | m | r | suddenly | swelling | - | - | NR | NR | CT | air density area in both parotid gland | massage in the periauricular region | other | punction guided with US | immediately | - | NR |
| Mandel et al. 1991 [27] | 53 | m | r | 3 years | recurrent swelling, discomfort | tenderness | - | + | + | sialography | contaminated ductal air causes a widely dilated primary duct with evidence of spherical radiolucency | a habit of blowing out the cheek | abnormal habit | advice | NR | NR | NR |
| Piette & Walker 1991 [28] | 34 | w | r | suddenly | swelling, sharp pain | - | NR | + | NR | radiography | well-demarcated radiolucent area | air syringe used during dental treatment | iatrogenic | antibiotics | + | NR | NR |
| Takenoshita et al. 1991 [29] | 24 | m | l | immediately | "squelching" or "squeaking noise," swelling | painful sensation | - | + | - | US | air in the left parotid gland as well as in the subcutaneous tissue | flashing the air syringe between the tray with hardened alginate impression | iatrogenic | antibiotics | 2 days | - | 1 year |
| Krief et al. 1992 [30] | 10 | m | bi | a few days | swelling, pain | NR | NR | + | - | CT, sialography | extensive cystic air collections mainly in the right parotid, air throughout both parotid ducts and local buccal air pockets near the orifices of Stensen's ducts; normal ducts bilaterally with spillage of contrast into the air cysts on the right | a habit of forcefully blowing out the cheeks | self-induced | antibiotics, advice, training | - | + | lost |
| Curtin et al. 1992 [31] | 36 | m | bi | 9 years | recurrent swelling | - | NR | + | NR | sialography, radiography, US | sialectatic air-containing ducts; multiple small hyperechoic areas bilaterally corresponding to air within the ducts | performing a Valsalva maneuver with an open glottis and nose occluded in an attempt to clear the ears | abnormal habit | advice not to puff out the cheeks | + | NR | NR |
| Ferlito et al. 1992 [32] | 14 | m | bi | 2 years | recurrent swelling, pain | - | nervous tic | NR | - | US, sialography, radiography | US: enlarged right parotid gland with various hyperechoic areas and acoustic shadows due to the presence of gas, sialography; no abnormalities, radiograph: the presence of gas bubbles within the right parotid | nervous tic consisting of his puffing out the cheeks with closed lips | diseases | antibiotics, anti-inflammatory drugs, corticosteroids | NR | NR | NR |
| Brown et al. 1992 [33] | 30 | m | l | shortly | shooting pain, swelling | - | - | - | - | - | - | barotrauma to the parotid secondarily the use of an air-powder prophylaxis unit | iatrogenic | NSAIDs, antibiotics | 5 days | NR | NR |
| Terahara et al. 1992 [34] | 9 | m | bi | 2 years | recurrent swelling | emphysema in the face and neck | mumps | + | NR | radiography, CT | air in both glands; emphysema in the face and neck | blowing the cheeks | self-induced | advice not to blow the cheeks | 1 day | + | NR |
| Yonetsu et al. 1993 [35] | 64 | m | l | 5–6 years | swelling | - | NR | NR | + | radiography, CT | loculated gaseous in the parotid region, the air in Stensen's duct, and the parotid gland ducts | idiopathic | idiopathic | refused | NR | NR | NR |
| Birzgalis et al. 1993 [36] | 16 | m | r | 2 months | pain, swelling | subcutaneous emphysema of the face and neck | pleomorphic adenoma | NR | - | CT | a rounded cystic lesion within the gland | elevating skin flap at will by a Valsalva maneuver | self-induced | antibiotics, advice | + | NR | NR |
| McDuffie et al. 1993 [37] | 24 | m | bi | 5 days | swelling | - | - | - | - | - | - | puffing cheeks to relieve irritation from the orthodontic braces | abnormal habit | instruction to refrain from puffing the cheeks | 2 days | NR | NR |
| Cook & Layton 1993 [38] | 44 | w | bi | NR | chronic swelling | - | congenital kyphoscoliosis, chronic obstructive pulmonary disease | - | - | radiography, sialography | normal | increased intraoral pressure needed for respiration during coughing attacks | diseases | NR | NR | NR | NR |
| Nassimbeni et al. 1995 [39] | 12 | m | bi | 1 year | recurrent swelling | subcutaneous emphysema | anxiety attacks and headaches | + | NR | sialography, CT | confirmation of clinical picture | blowing it up and deflating it | self-induced | extensive treatment with a child psychiatrist and psychologist | + | - | 8 years |
| 9 | m | r | NR | recurrent swelling | pyopneumoparotitis | unhappy family situation | NR | NR | radiography, US, sialography | presence of air bubbles | inflating and deflating the parotid at will | self-induced | aspiration, antibiotics, surgical incisions | + | - | NR |
| Goguen et al. 1995 [40] | 9 | m | r | 3 days | swelling | - | NR | NR | + | CT | air in the right parotid gland and duct | blowing hard against the palm | abnormal habit | antibiotics, explanation of the maladaptive behavior, and potential complications | 1 day | - | NR |
| 9 | w | bi | a long history | recurrent swelling | tenderness | recurrent parotitis | + | - | CT | air within the left and right glands | a habit of repeatedly blowing up the parotid gland by Valsalva's maneuver with a closed mouth | abnormal habit | antibiotics, advice to stop the behavior, left superficial parotidectomy | NR | - | NR |
| 13 | m | bi | 5 years | recurrent swelling | - | recurrent juvenile parotitis | NR | + | radiography, sialography | Xray; air in the parotid region, sialography; normal | blowing up his cheeks, which always occurred on Sunday afternoons and possibly a maneuver to avoid school | self-induced | psychiatric counseling | NR | NR | NR |
| Nakamura et al. 1996 [41] | 10 | m | bi | 4 years | recurrent swelling, pain | emphysema in the temporal region | acute parotitis, acute otitis media, acute sinusitis, cervical lymphadenitis | + | - | radiography, CT | air in the right gland, emphysema in the temporal region | self-inflating the parotid glands, psychological problems | self-induced | antibiotics, advice not to blow his cheeks | 2 weeks | + | NR |
| Ros et al. 1996 [42] | 3 | m | l | 1 day | swelling, pain | - | - | - | - | - | - | blowing balloon | balloon | consumption of orange juice, which resulted in the expulsion of the trapped air | immediately | NR | NR |
| Eligi et al. 1997 [43] | 50 | m | l | 2 months | recurrent swelling, pain | NR | - | NR | - | radiography, US, CT | air in the enlarged duct and gland | Idiopathic | idiopathic | antibiotics | + | - | 6 months |
| Barthold 1998 [44] | 18 | w | bi | 5 years | recurrent swelling | subcutaneous emphysema of the neck | tonsillectomy | + | + | US, sialography, CT, MRI | air in the bilateral parotid glands | Valsalva's maneuver | abnormal habit | antibiotics | NR | NR | NR |
| Gudlaugsson et al. 1998 [45] | 16 | w | bi | 9 months | recurrent swelling, tenderness | subcutaneous emphysema, pneumomediastinum | orofacial tics | + | NR | CT | parotid swelling, air both within the parotid glands on the right side, air in the soft tissue extending from the parotid region down the neck to the thyroid gland | a habit of biting the lower lip and whistling with a high-frequency sound | abnormal habit | explanation of the risk of the habit | within 24 hours | twice | 1 year |
| Alcalde et al. 1998 [46] | 29 | m | r | 3 months | pain, swelling | bilateral tinnitus, headache | trauma to the head and maxillofacial region | + | + | CT, sialography | a round, well-circumscribed radiolucency compatible with air within the parotid gland air within the parotid gland | trauma to the head and maxillofacial region | diseases | needle aspiration, NSAIDs, antibiotics | NR | NR | refused |
| Leuwer & Greess 1998 [47] | 25 | m | l | 3 months | recurrent swelling | - | NR | + | NR | CT | the air-filled parotid duct on the left, bubble-like accumulations of air appeared in the parotid | cheek puffing | abnormal habit | NR | NR | NR | NR |
| Golz et al. 1999 [48] | 10 | m | bi | 2 years | recurrent swelling | - | mumps | - | - | CT | bilateral enlargement of the parotid glands, extensive cystic air collections in the parotid glands' parenchyma, and air throughout both parotid ducts | holding the nose and mouth and blowing out the cheeks whenever he did not want to go to school | self-induced | psychological evaluation and counseling | + | - | 1 year |
| Sittel et al. 1999 [49] | 14 | w | bi | 3 years | recurrent swelling | - | constant itching in both external ear canals | NR | + | MRI | massive luminal widening of Stensen's duct, complete loss of signal inside the parotid duct due to air insufflation | puffing the cheeks whenever the itching became unbearable | abnormal habit | antibiotics, advice to change the behavior | few days | NR | lost |
| Kirsch et al. 1999 [50] | 41 | m | l | immediately | swelling | sense of fullness without pain | viral upper respiratory tract infection | - | - | CT | air within the left parotid gland and Stensen's duct. | spirometry; sometimes producing facial swelling at will by coughing or blowing forcefully against the closed mouth | iatrogenic | NR | NR | NR | NR |
| Martín-Granizo et al. 1999 [51] | 5 | w | bi | NR | pain, recurrent swelling | - | recurrent parotitis and sialectasis | NR | NR | radiography, US, CT | an increased density of the left parotid parenchyma with multiple air acinic images | idiopathic | idiopathic | antibiotics, hydration, warm compresses | NR | NR | NR |
| 8 | w | r | 1 week | pain, recurrent swelling | - | febrile convulsions, bronchitis with intense spasms of coughing | + | NR | sialography, CT | several air bubbles inside the parotid parenchyma | excessive intraoral pressure provoked by repeated spasms of coughing | diseases | NR | NR | NR | NR |
| Huang et al. 2000 [52] | 50 | m | bi | a long history | nasal congestion | - | postnasal drainage, nasal congestion | NR | - | CT | air in the bilateral Stensen's ducts | idiopathic | idiopathic | observation | NR | - | 1 month |
| Yokoyama et al. 2001 [53] | 9 | m | bi | 3 months | recurrent swelling, pain | subcutaneous emphysema in the left face and neck | mumps | + | + | CT | air in the left parotid gland, face, and neck | idiopathic | idiopathic | antibiotics | 6 days | + | 6 months |
| Cho et al. 2001 [54] | 42 | m | l | NR | swelling | - | - | NR | + | CT, sialography | small air collection in the left parotid gland | trumpet playing with puffed cheeks | wind instruments | advice not to play trumpet with puffed cheeks | NR | NR | NR |
| Franco et al. 2002 [55] | 10 | w | l | several days | swelling | subcutaneous emphysema in the left neck | mumps | NR | - | CT | air in the left parotid gland and duct | nervous tic; autoinsufflation | diseases | etiologic and symptomatic treatment | NR | NR | NR |
| Brasseur et al. 2003 [56] | 31 | w | bi | NR | recurrent swelling | dysphagia, cervical and facial subcutaneous emphysema | asthma, borderline personality disorder, Munchausen syndrome | + | + | US, CT | numerous intraparenchymal hyperechogenic islets corresponding to air bubbles | auto-mutilation and intentional production of physical symptoms | self-induced | antibiotics, neuroleptic, antidepressant, anxiolytic | 15 days | NR | lost |
| Orabi & Nigam 2004 [57] | 21 | w | bi | 13 years | recurrent swelling, pain | subcutaneous emphysema | asthma, miscarriage | - | - | radiography, sialography, CT, US | air in both parotids as well as in subcutaneous tissue | self-induced | self-induced | psychological counseling | 1–2 days | + | lost |
| Han and Isaacson 2004 [58] | 13 | m | r | NR | recurrent swelling | subcutaneous emphysema in the face and neck | left recurrent parotitis, attention deficit hyperactivity disorder | + | NR | sialography, CT | extensive air in the ductal system with extension into the soft tissues from the skull base to the lung apex | idiopathic | idiopathic | antibiotics, ductal ligation | 1 week | - | 2 years |
| Apaydin et al. 2004 [59] | 50 | m | l | 18 months | recurrent swelling | tenderness, xerostomia | - | + | - | CT, MRI | a big cyst containing air in the left parotid gland | idiopathic | idiopathic | cystectomy | + | 3 days after | 6 months |
| Maehara et al. 2005 [60] | 15 | m | bi | a long history | recurrent swelling, tenderness | - | Mumps | NR | NR | CT | very small amounts of air throughout most of the right parotid | a habit of blowing out the cheeks | abnormal habit | explanation and advice to not blow the cheeks | + | NR | NR |
| De Meerleer & Hermans 2005 [61] | 20 | w | bi | 1 year | recurrent painful swelling | NR | NR | + | + | CT | bilateral enlargement of the parotid glands, with several intraglandular air collections (more on the left side), as well as air-filled dilation of Stensen's duct on the left side | idiopathic | idiopathic | surgical repositioning of both parotid ducts orifices via a submucosal tunnel (Wilkie-Brody procedure) | NR | NR | NR |
| Grainger et al. 2005 [62] | 12 | w | bi | 6 months | recurrent swelling, pain | NR | NR | NR | NR | sialography, CT | mild chronic inflammation; air in both parotid glands | idiopathic | idiopathic | conservative management (antibiotics and analgesia) | several hours and days | + | 9 years |
| Paskoy et al. 2006 [63] | 38 | m | bi | several years | swelling | NR | NR | NR | + | CT, US | air within bilateral parotid glands | induced by Valsalva technique | abnormal habit | Advice | + | - | 1 year |
| Scherr et al. 2006 [64] | 34 | m | r | a few hours | discomfort, crepitus | NR | NR | + | NR | US, CT | an air-filled Stensen's duct, which is thickened when compared to the sides, and predominantly blister-like, partly also longitudinally arranged accumulations of air in the entire parotid parenchyma | very forced and recurrent increase in intraoral pressure by blowing into the fanfare | wind instruments | antibiotics | 1 week | - | NR |
| Adachi 2006 [65] | 59 | m | r | Suddenly | swelling | emphysema in the face and neck | purulent meningitis, mental retardation | + | NR | radiography, CT | air in the parotid gland and enlargement of the duct | a habit of repeatedly blowing out the mouth | abnormal habit | antibiotics | - | + | NR |
| Yang et al. 2007 [66] | 10 | w | r | 1 day | swelling | subcutaneous emphysema in the neck and mediastinum | NR | + | NR | CT, US | air in bilateral parotid glands and ducts | playing flute | wind instruments | antibiotics, needle aspiration | 7 days | - | NR |
| Chun et al. 2007 [67] | 18 | m | bi | 3 months | swelling, pain | NR | NR | + | + | CT | air within bilateral parotid glands | insufflation of air within the gland with a closed mouth to take a break from work | self-induced | antibiotics, cognitive behavioral therapy | 5 days | - | 7 months |
| Balasubramanian et al. 2008 [68] | 11 | m | bi | 2 years | recurrent swelling | pus discharge from the duct, enlargement of the left parotid gland, subcutaneous emphysema | - | + | - | sialography, CT | evidence of reduced function in the left parotid gland; left-sided pneumoparotid | with a handkerchief in hand and blow forcefully into the closed hand puffing out the cheeks like a Valsalva-like maneuver | self-induced | counseling | dramatic recovery | - | NR |
| Núñez et al. 2008 [69] | 28 | w | l | NR | swelling | cracking on palpation | Down's syndrome | + | NR | radiography, CT | a large amount of air was identified in the parenchyma and the internal duct system of the parotid gland | insufflation of air within the gland by performing forced Valsalva techniques to obtain the attention and care of parents | self-induced | NR | + | - | NR |
| Luaces et al. 2008 [70] | 11 | m | r | 15 days | pain, swelling | subcutaneous emphysema | - | + | + | CT | dilated right intraglandular and extra glandular ducts and also a moderate amount of air in the right parotid duct | the unconscious habit of blowing out the cheeks as an | abnormal habit | antibiotics, massage | NR | - | 1 year |
| Joo et al. 2008 [71] | 20 | m | l | 1 month | swelling | bilateral hearing impairment | NR | + | + | CT | enlargement of the left duct and air in the duct | lifting of heavy luggage | other | antibiotics, massage, ligation of left Stensen's duct | 2 weeks | - | 1 year |
| Prabhu & Tran 2008 [72] | 12 | m | bi | NR | recurrent swelling | - | NR | NR | NR | CT | extensive ductal and acinar pneumatic dilation; air in both parotid glands and Stensen's ducts | puffing out of the cheeks to prevent irritation by orthodontic braces | abnormal habit | antibiotics, counseling | NR | NR | NR |
| Faure et al. 2009 [73] | 9 | m | l | 3 years | recurrent swelling | emphysema extending into the left cheek, the parotid gland region, and the adjacent lateral cervical region | NR | + | + | CT | air inside the left parotid duct, as well as extra ductal air within the parotid gland, subcutaneous soft tissues, and even in the parapharyngeal space | puffing the cheeks in stressful situations; conflicts with the child's parents as the most probable cause of chronic stress | abnormal habit | antibiotics, psychiatric counseling | NR | NR | NR |
| Mukundan & Jenkins 2009 [74] | 13 | m | l | 2 days | swelling, pain | - | NR | NR | + | CT | air in the left parotid gland and the parotid duct | playing tuba | wind instruments | conservative management | within days | NR | NR |
| Lee et al. 2009 [75] | 21 | m | l | 6 months | swelling | - | NR | + | + | CT | air in the left duct and the gland | a habit of blowing the cheeks | abnormal habit | instruction to avoid blowing cheeks | + | 1 year | NR |
| Moënne et al. 2009 [76] | 13 | m | r | 3 hours | swelling | tenderness, swelling | NR | NR | NR | US | thickness of the parotid parenchyma. Presence of echogenic linear images with the appearance of corresponding to air, which also demonstrated throughout the length of Stensen's duct | inflating balloons for hours | balloon | analgesia | 2 days | - | 3 years |
| 10 | m | r | NR | pain, swelling | - | NR | NR | NR | US | presence of a small amount of air in the intraglandular ducts, in both parotids, without other associated alterations | inflating lots of balloons | balloon | analgesia | 2 days | - | NR |
| 5 | w | l | several hours | pain, swelling | tenderness | NR | NR | NR | US | repeatedly submerging in the pool to make "bubbles," for what which she kept the air in the oral cavity before getting the water | repeatedly submerging in the pool to make "bubbles," for what which she kept the air in the oral cavity before getting the water | other | NR | + | - | NR |
| 9 | w | r | 2 days | pain, swelling | - | NR | NR | NR | US | increased volume of the parotid right, with focal areas of increased echogenicity, in the thickness of the gland, a linear path echogenic suggestive of corresponding to air | blowing a hard wooden flute | wind instruments | NR | rapidly | - | NR |
| Kyung et al. 2010 [77] | 7 | w | bi | NR | pain, extensive edema of the face and neck | subcutaneous facial and cervical emphysema | - | NR | NR | CT | presence of numerous air bubbles in both parotids and Stensen's duct, with gaseous effusion extending to the neck and mediastinum | a very energetic and unusual way of blowing on a new recorder with all holes covered | wind instruments | putting a stop to the trigger factor, antibiotics, and analgesics | a few days | 1 month later | 2 years |
| Fukuta et al. 2011 [78] | 34 | m | r | 6 months | recurrent swelling, discomfort | - | - | - | + | CT, MRI | air in both parotid glands, enlargement of both ducts | a habit of blowing out the cheeks | abnormal habit | advice not to blow the cheeks | + | NR | 8 months |
| Kolti 2011 [79] | 27 | m | l | NR | recurrent pain, swelling | - | NR | + | NR | - | - | inflating toys and balloons | balloon | instruction to avoid the precipitating factor (balloon-blowing) | NR | NR | NR |
| van Ardenne et al. 2011 [80] | 7 | w | l | 1 month | swelling | - | NR | - | - | CT | bilateral dilated intraglandular and extra glandular ducts, a large amount of air in the left parotid gland, and a small amount of air in the right parotid gland and duct | a habit of blowing out her cheeks in a stressful situation | abnormal habit | explanation and advice not to blow up the cheeks | NR | NR | NR |
| Iwaki et al. 2011 [81] | 20 | m | r | NR | swelling | - | NR | + | + | CT | air in the parotid gland, enlargement of Stensen's duct | a habit of blowing the cheeks | abnormal habit | instruction and massage | 1 week | NR | NR |
| Vasi & Hoskins 2011 [82] | 30 | m | bi | 22 years | recurrent pain and swelling | sound of "wind" | - | + | + | CT | air within ducts and parotid glands | idiopathic | idiopathic | antibiotics | - | + | NR |
| Zuchi et al. 2011 [83] | 50 | w | l | 3 years | pain, swelling | edema in the left cervical and mandibular regions | NR | NR | NR | US, CT | US: a solid nodule with small peripheral calcification on the left gland CT: multiple air-filled small cavitations within the ductal tree and in the Stensen duct | idiopathic | idiopathic | sulphamethoxazole, trimethoprim, local symptomatic measures | - | + | 1 year |
| Ghanem et al. 2012 [84] | 46 | m | l | 5 years | discomfort, swelling | - | NR | + | + | US, sialography | multiple hyperechoic spots throughout the gland, representing small focal collections of air | idiopathic | idiopathic | NR | NR | NR | NR |
| Tekelioglu et al. 2012 [85] | 57 | w | l | after general anesthesia | swelling | - | Hypertension | + | NR | - | - | general anesthesia | iatrogenic | observation | 2 days | - | NR |
| Tachibana et al. 2012 [86] | 7 | m | l | 1 month | recurrent swelling, tenderness | subcutaneous emphysema | Asthma | + | NR | CT | air in the left parotid, expanding subcutaneous emphysema | "inflatable" mouth | abnormal habit | antibiotics, advice not to inflate the mouth | 2 days | - | 3 months |
| Li et al. 2012 [87] | 18 | m | l | 6 months | swelling | facial trauma | NR | NR | + | CT, sialendoscopy | gas in the left parotid gland, bubbles in the Stensen's duct, enlargement of the duct | facial trauma | other | antibiotics | - | - | 6 months |
| McCormick et al. 2013 [88] | 7 | m | bi | 4 years | recurrent swelling | tenderness | G6PD deficiency, mild obstructive sleep apnea syndrome, allergic rhinitis | NR | NR | CT | cystic air-filled dilations were identified within the parotid glandular tissue | idiopathic | idiopathic | antibiotics, NSAID | NR | NR | NR |
| Potet et al. 2013 [89] | 44 | w | l | 2 weeks | swelling, pain | slight fever | NR | NR | NR | US, MRI, CT | air within the left parotid duct and left parotid parenchyma. | idiopathic | idiopathic | antibiotics | + | NR | NR |
| McGreevy et al. 2013 [90] | 48 | m | bi | 25 years | recurrent swelling, pain | infection of the gland | - | + | + | CT | air within both parotid glands, a fluid level with cystic changes, and dilated air-filled intraparotid ducts in the right gland | self-insufflating both parotid glands by expiring against a closed mouth | self-induced | right parotidectomy | NR | NR | NR |
| Pillay & Goh 2014 [91] | 61 | w | r | immediately | swelling | - | diabetes mellitus, hypertension, systemic lupus erythematosus | - | NR | - | - | upper endoscopy | iatrogenic | observation | 3 hours | - | 1 week |
| Watanabe et al. 2014 [92] | 52 | m | r | Suddenly | pain, swelling | - | gout, hyperlipidemia | - | + | CT | air in the right parotid gland | air syringe used during dental treatment | iatrogenic | antibiotics | NR | - | 1 month |
| Nicot et al. 2014 [93] | 8 | m | r | 2 years | recurrent swelling | - | NR | NR | - | CT | air in the gland and duct | dive holding breath | other | change in habits (stopping the dive holding breath during swimming sessions) | 2–3 days | NR | NR |
| Almario Hernández et al. 2014 [94] | 7 | m | L | Soon | swelling | - | NR | + | NR | US | Normal | blowing balloon | balloon | antibiotics | + | NR | NR |
| Konstantinidis et al. 2014 [95] | 61 | m | bi | 2 years | recurrent swelling | - | right sialadenitis | - | + | CT | the presence of air in both ductal systems with more prominent in the right parotid gland | idiopathic | idiopathic | sialendoscopy and irrigation with steroids | 6 months | twice | 6 months |
| Ino et al. 2015 [96] | 40 | m | bi | 1 week | pain, swelling | fever, cough | Mumps | - | + | CT | air in the bilateral ducts and parotid glands | elevation of intraoral pressure due to suppression of cough | diseases | antibiotics | 10 days | + | NR |
| 61 | w | r | 10 years | recurrent swelling | - | Xerostomia | - | - | CT | air in the right enlarged duct | blowing mouth to relieve discomfort | abnormal habit | minor tranquilizer, advice | NR | NR | 6 months |
| 24 | m | R | 2 years | swelling | - | recurrent parotitis | - | - | CT | air in the right duct | puffing out the cheeks | abnormal habit | antibiotics, minor tranquilizer, advice | NR | NR | lost |
| 15 | m | bi | NR | recurrent swelling | NR | NR | NR | NR | CT | air in the left gland | swelling before the exam or after parents' blame | self-induced | NR | NR | NR | NR |
| 52 | w | r | NR | NR | NR | Insomnia | NR | NR | CT | air in the right gland | puffing out the cheeks in a nervous or uncomfortable situation | abnormal habit | NR | NR | NR | NR |
| 33 | w | r | NR | feeling of fullness | NR | NR | NR | NR | CT | air in the right gland | puffing out the cheeks | abnormal habit | NR | NR | NR | NR |
| 56 | m | l | NR | NR | NR | Stress | NR | NR | CT | air in the left gland | blowing mouth when tired | abnormal habit | NR | NR | NR | NR |
| 17 | m | r | NR | NR | NR | Stress | NR | NR | CT | air in the right gland | blowing mouth in a stressful situation | abnormal habit | NR | NR | NR | NR |
| Dietrich et al. 2015 [97] | 33 | m | r | NR | swelling | NR | NR | + | - | US, sialography, CT | air in the right duct | blowing balloon | balloon | instruction to avoid the precipitating factor (balloon-blowing) | NR | NR | NR |
| Bowden & Bowden 2015 [98] | 4 | m | l | Soon | face and neck swelling, pain | cervicofacial subcutaneous emphysema | NR | + | NR | radiography | subcutaneous emphysema in the left paramandibular area and left-sided neck | blowing balloon | balloon | instruction to refrain from performing any activities that can cause high intraoral pressure, such as blowing up a balloon | 3–4 days | NR | NR |
| Cabello et al. 2015 [99] | 42 | m | r | 3 months | swelling, pain | - | moderate obstructive sleep apnea syndrome | + | NR | US, CT | normal morphology; the presence of numerous air bubbles in the right parotid and gas along the right duct | blowing all night, and sometimes his wife heard an intense whistle. | diseases | NSAIDs | NR | NR | NR |
| Osawa et al. 2015 [100] | 11 | m | l | 2 days | recurrent swelling, pain | emphysema in the face and neck; pneumomediastinum | mumps, cyclic vomiting syndrome | + | - | CT | air in bilateral glands and neck | elevation in oral pressure due to suppression of vomiting | diseases | antibiotics, advice not to blow the cheeks due to suppression of vomiting | 6 days | + | NR |
| Shibata & Harada 2016 [101] | 6 | m | l | 1 month | recurrent swelling, pain | - | Mumps | NR | + | CT | air in the Stensen's duct | a habit of blowing the cheeks | abnormal habit | antibiotics, instruction to stop blowing cheeks | 1 month | - | NR |
| 43 | w | l | 6 days | pain, swelling | - | - | NR | - | CT | enlargement of Stensen's duct due to the retrograde passage of air and emphysema in the left parotid gland | Idiopathic | idiopathic | antibiotics | 1 month | - | NR |
| Abdullayev et al. 2016 [102] | 36 | NR | bi | 3 days | swelling | chronic obstructive pulmonary disease | congenital bronchiectasis, chronic obstructive pulmonary disease | NR | NR | US | Parotitis | non-invasive positive pressure ventilation | iatrogenic | antibiotherapy, non-invasive CPAP, bronchodilator therapy | NR | NR | NR |
| Lagunas & Fuertes 2017 [103] | 13 | m | bi | 5 years | recurrent swelling | emphysema in the neck and face | recurrent chronic parotitis | NR | NR | CT | presence of air inside the entire path of the duct extending into the parotid gland and dissecting through the deep space of the neck into the parapharyngeal space and the infratemporal fossa | aspirating deeply inside the mouth | self-induced | antibiotics, NSAIDs | NR | NR | NR |
| Alnæs & Furevik 2017 [104] | primary school age | w | l | a few days | swelling, pain, redness of the skin | emphysema in the left face | - | NR | NR | US, CT | artifacts consistent with air; pronounced emphysema throughout the left side of the face | blowing on a paper trumpet and sucking on water bottles | wind instruments | antibiotics, aspiration of the parotid duct | rapidly | + | NR |
| Oh et al. 2017 [105] | 21 | w | bi | 3 weeks | swelling, pain | - | NR | + | + | CT | multiple-filled spaces within the bilateral parotid glands and air in bilateral dilated Stensen's ducts | a habit of blowing the cheeks | abnormal habit | instruction not to blow the cheeks | 1 week | - | 1.5 years |
| Lee et al. 2017 [106] | 11 | m | l | 6 hours | swelling, pain | emphysema in the neck and face, pneumomediastinum | - | + | NR | radiography, US, CT | extensive subcutaneous emphysema involving the left side of the face and neck | Idiopathic | idiopathic | antibiotics | 5 days | NR | NR |
| Kwon et al. 2017 [107] | 38 | w | l | 3 years | recurrent swelling | - | left masseter pain | + | + | CT | air in the left parotid gland | a habit of blowing out the cheeks | abnormal habit | instruction to avoid blowing out the cheeks | + | - | 5 months |
| Goates et al. 2018 [108] | 53 | m | l | 2 months | swelling | foul-tasting, thick mucus draining | obstructive sleep apnea syndrome, Sjögren syndrome, Warthin's tumor | NR | + | CT, sialoendoscopy | air in the left parotid gland | CPAP for 5 years | iatrogenic | transfer from full-face to nasal CPAP | 2 weeks | - | 6 months |
| 54 | m | r | 7 months | recurrent swelling | parotitis | obstructive sleep apnea syndrome, Sjögren syndrome, Warthin's tumor | NR | NR | sialography | parotid gland strictures with multiple air locules with distal megadilation of the duct | CPAP for 10 years | iatrogenic | antibiotics, transfer from full-face to nasal CPAP | - | + | 1 year |
| Yamazaki et al. 2018 [109] | 53 | m | bi | 1 year | "squishy" sound | - | vitiligo vulgaris | + | + | radiography, US, MRI | enlargement of the left parotid duct and high-echogenicity areas inside the bilateral parotid ducts | bilateral compression of the buccal region | abnormal habit | instruction to stop compressing the buccal region | + | + | NR |
| Paterson et al. 2018 [110] | 24 | m | l | 6 months | swelling | - | NR | NR | NR | CT | a 4.5 cm by 3.5 cm air pocket within the left parotid gland | Idiopathic | idiopathic | needle aspiration | + | NR | NR |
| House & Lewis 2018 [111] | 34 | m | bi | NR | recurrent sensation of a "pop" | emphysema in the head and neck, nausea, vomiting | bipolar disorder | + | NR | CT | subcutaneous emphysema of the left facial and bilateral neck soft tissues, from the level of the scalp to the sternal notch | self-induced to leave prison | self-induced | antibiotics | - | + | NR |
| Miłoński et al. 2019 [112] | 54 | m | l | 3 weeks | swelling | pain | NR | NR | NR | US, CT | a thickening of the parotid parenchyma with a low-echoic focal lesion; air in the excretory ducts, and an air bubble about 2 cm in diameter in the vicinity of the gland | a habit of putting the tongue into the left cheek | abnormal habit | conservative treatment (a pressure dressing), excision of the left pneumoparotid | + | NR | NR |
| Ambrosino et al. 2019 [113] | 12 | m | bi | 2 years | recurrent swelling, pain | subcutaneous emphysema | juvenile Sjögren syndrome | + | + | CT, sialendoscopy | uncommon aeric formation | Idiopathic | idiopathic | antibiotherapy, parotid massage, painkillers | - | + | NR |
| Basha 2019 [114] | 40 | m | r | 1 year | recurrent swelling | tenderness | - | NR | + | US, CT | mild enlargement and hyperechoic cluster of foci with posterior acoustic shadow likely of being a calculus; right parotid enlargement with multiple free air foci within the gland parenchyma, discrete dense foci of small calcifications | insufflation of air from the mouth | abnormal habit | advice not to hold air mouth and blow with pressure | + | - | 6 months |
| Raczkowska-Łabuda et al. 2019 [115] | 12 | m | bi | 6 months | swelling | - | NR | NR | NR | CT, US, sialography | a 23 mm space filled with air in the right parotid region, air in the salivary ducts of the right parotid gland | deliberate inflating of both parotid glands | self-induced | antibiotics, irrigation | + | - | 3 months |
| Kim et al. 2019 [116] | 67 | m | l | NR | parotid mass | - | NR | NR | NR | CT | a 1 cm-sized enhancing nodular lesion in the left parotid gland | Idiopathic | idiopathic | observation | - | - | 4 years |
| Enami et al. 2020 [117] | 37 | w | l | Suddenly | swelling, pain | - | - | - | - | CT | air in the left parotid gland | dental examination using an air syringe | iatrogenic | antibiotics | 2 weeks | - | NR |
| Yang & Bundrick 2020 [118] | 30s | m | bi | NR | pain, swelling | subcutaneous emphysema in the neck and mediastinum | - | NR | + | CT | intraluminal air in the left parotid duct with associated pneumoparotid and dissection of air into the left parapharyngeal and masticator spaces | puffing out the cheeks to force air into the neck with subsequent decompression of air back into the oral cavity by pushing behind the ear | abnormal habit | antibiotics | NR | NR | NR |
| Sinha et al. 2020 [119] | 50 | w | bi | NR | recurrent swelling | NR | - | + | + | US | presence of hyperechoic air bubbles within the duct and the surrounding salivary gland tissue | habitually puffing the cheeks | abnormal habit | encouragement to break the habit | NR | NR | NR |
| Gazia et al. 2020 [120] | 45 | m | l | NR | painful swelling | subcutaneous emphysema that affected caudo-cranial left soft tissues from the temporal region to the upper thoracic outlet | cognitive disability | + | NR | CT | air in the left parotid gland, severe ectasia of Stensen's duct | Idiopathic | idiopathic | antibiotics, psychiatric therapy | NR | NR | NR |
| Gray et al. 2020 [121] | 9 | w | l | 1 month | swelling | subcutaneous emphysema | Trisomy 21 (Down's syndrome) | NR | NR | CT | gas within the ductal system of the parotid gland | voluntarily blowing up her cheeks | abnormal habit | fine needle aspiration | NR | NR | NR |
| Aljeaid et al. 2020 [122] | 12 | m | l | 3 months | recurrent painless swelling | temporal subcutaneous emphysema | - | NR | - | CT | presence of a rounded air-filled left parotid, bilateral dilation of the Stensen's duct | blowing balloon | balloon | advice to avoid the precipitating factor (balloon-blowing) | 2 days | - | 2 years |
| Al Ohali et al. 2020 [123] | 14 | m | L | 7 months | recurrent swelling | NR | Asthma | + | + | CT | a large air sac in the left parotid gland in its superficial part extending to the duct and sparing the deep part | a habit of blowing the cheeks | abnormal habit | advice not to blow his cheeks | + | - | 2 years |
| Fernandez et al. 2020 [124] | 25 | m | r | NR | sensation and noise described as a "sponge crunching" | - | adenoidectomy | + | + | US, CT | presence of air in the ductal system and within the gland | Idiopathic | idiopathic | conservative measures | NR | NR | NR |
| Yoshida 2022 [125] | 57 | m | bi | 1 year | recurrent swelling, pain | - | obstructive sleep apnea syndrome | + | + | CT | air within the bilateral parotid ducts and parotid parenchyma | obstructive sleep apnea syndrome, hichiriki, air flight | diseases | oral appliance | 1 week | + | 10 years |
| Goncalves et al. 2022 [126] | 59 | m | l | Years | NR | NR | NR | NR | + | US | hyperechoic reflexes appearing like a trail, which are termed as "sunbeam effects" (major reverberation effects) | primary papilla insufficiency | idiopathic | NR | NR | NR | NR |
| 28 | m | r | 2 months | chronic parotitis | NR | chronic parotitis | NR | + | US, sialendoscopy | "sunbeam effects" | primary papilla insufficiency, chronic parotitis | idiopathic | NR | NR | NR | NR |
| 11 | m | l | 4 months | NR | NR | NR | NR | + | US | "sunbeam effects" | primary papilla insufficiency | wind instruments | NR | NR | NR | NR |
| 56 | m | r | Years | NR | NR | duct anomaly | NR | + | US, sialendoscopy | multiple hyperechoic reflexes within the parenchyma, with strong acoustic shadowing due to the amount of reflexes, with a weak "sunbeam effects" or dirty shadow | primary papilla insufficiency, duct anomaly | idiopathic | NR | NR | NR | NR |
| 49 | w | r | Years | chronic parotitis | NR | NR | NR | + | US, sialendoscopy | "sunbeam effects" | primary papilla insufficiency, chronic parotitis | idiopathic | NR | NR | NR | NR |
| 64 | m | r | Months | NR | bruxism | NR | NR | + | US, sialendoscopy | "sunbeam effects" | primary papilla insufficiency | idiopathic | NR | NR | NR | NR |
| 20 | m | r | 2 years | sialectasis parotid duct system | bruxism | NR | NR | + | US | "sunbeam effects" | primary papilla insufficiency, sialectasis parotid duct system | idiopathic | NR | NR | NR | NR |
| 56 | m | l | 5–6 years | NR | NR | NR | NR | + | US, sialendoscopy | "sunbeam effects" | primary papilla insufficiency | idiopathic | NR | NR | NR | NR |
| 62 | m | l | 2 years | NR | NR | NR | NR | + | US | "sunbeam effects" | primary papilla insufficiency, blowing the nose with a closed mouth | abnormal habit | NR | NR | NR | NR |
| 71 | m | l | Months | NR | NR | NR | NR | + | US, sialendoscopy | "sunbeam effects" | primary papilla insufficiency | idiopathic | NR | NR | NR | NR |
| 14 | m | l | 1 month | NR | NR | NR | NR | + | US, sialendoscopy | presence of multiple small, flattened, mobile, hyperechoic reflexes within the parenparenchyma, which show reverberation effects with dirty shadows and "sunbeam effects" | primary papilla insufficiency | wind instruments | NR | NR | NR | NR |
| 40 | w | l | 5 years | chronic sialectatic parotitis | NR | NR | NR | + | US, sialendoscopy | "sunbeam effects" | primary papilla insufficiency, chronic sialectatic parotitis | idiopathic | NR | NR | NR | NR |
| 48 | w | r | 1 year | NR | NR | SLE, Sjögren syndrome with MALT-lymphoma | NR | + | US, sialendoscopy | "sunbeam effects" | primary papilla insufficiency, radiotherapy | other | NR | NR | NR | NR |
| 41 | m | r | Years | chronic parotitis | bruxism | NR | NR | + | US, sialendoscopy | "sunbeam effects" | primary papilla insufficiency, chronic parotitis | idiopathic | NR | NR | NR | NR |

bi, bilateral; l, left; r, right; NR, not reported; CT, computed tomography; US, ultrasound; MRI, magnetic resonance imaging; CPAP, continuous positive airway pressure; NSAIDs, nonsteroidal anti-inflammatory drugs.