

Supplementary Table 1. Summary of 128 manuscripts on pneumoparotid.

First Author	Sex	Age	Side	First clinical department	Chief complaint	Other symptoms	Recurrent	Creptitant	Air bubbles	Diagnostic imaging	Significant imaging	Insignificant imaging	Etiology	Etiology Group	Treatment	Complications
Gaus 1941 [14]	M	23	B	OTO	recurrent swelling	N	Y		Y	sialography	sialography		trumpet	wind instruments (trumpet)		
Rysenaer 1963 [15]	F		B	OTO	swelling, unpleasant tension, pain			N	N	sialography		sialography	nervous tic	self-induced	behavior modification	subcutaneous emphysema
Rupp 1963 [16]	M	11	B	OTO	recurrent swelling	N	Y	Y	Y	X-ray, sialography	X-ray, sialography		blowing very strongly with the back self-induced observation of the hand occluding the mouth	self-induced	observation	
Reitlinger 1964 [17]	M	55	R		recurrent swelling, pain	emphysema in the right face and neck, sialolith	Y		N	X-ray, sialography	X-ray, sialography		trumpet	wind instruments (trumpet)	medicine (antibiotics) →surgery	subcutaneous emphysema
Yoel 1970 [18]	M	45	B	OTO	swelling, heat and pressure	nausea, vertigo				sialography		sialography	blowing glass	blowing glass	resigned from the job	subcutaneous emphysema
	M	54	L	OMS	Swelling	N		Y	Y	sialography	sialography			self-induced	medicine (antibiotics) →sympathetic infiltrations and instillations	
	M	57	R	OMS	swelling, pain	N				X-ray, sialography	X-ray, sialography		sneezing crisis	disease	medicine (antibiotics)	
Rosefsky 1970 [19]	M	8	B	PDES	recurrent swelling, pain		Y	N	N	X-ray, sialography	sialography	X-ray	sneezing crisis diseases not only dislike of school but also fears concerning the distortion of and threats to body image	self-induced	psychotherapy, medicine (bethanechol)	

Calcaterra 1973 [20]	M	14	L	OTO	swelling, pain	subcutaneous emphysema over the left parotid gland, pneumomediastinum		Y		X-ray, sialography	X-ray	sialography	a habit of blowing out the cheeks	self-induced	psychotherapy, medicine (antibiotics)	subcutaneous emphysem, pneumomediastinum
O'Hara 1973 [21]	M	19	L		recurrent swelling, pain	subcutaneous emphysema of the face and neck	Y	Y	Y	X-ray, sialography	sialography, X-ray		swelling during sleeping	idiopathic	surgery, psychotherapy	
Watt 1977 [22]	M		R		emphysema of the right side of the face		Y			sialography	sialography		inflating the parotid until infection supervened	self-induced	surgery, psychotherapy	
Sánchez 1980 [23]	F	15	B		recurrent swelling, dysphagia	emphysema in the face and neck	Y			sialography	sialography		self-injury into the Stesen's duct with pins	self-induced	Medicine (antibiotics), massage	
Hadas 1982 [24]	M	16	B	ER	recurrent swelling, pain	feeling of oppression	Y			sialography, US, X-ray, salivary gland scintigraphy	sialography, X-ray	US, salivary gland scintigraphy	mental pathology	disease	psychotherapy	
Aristy 1982 [25]	M	17	R		swelling	emphysema in the face and neck		Y		X-ray	X-ray		asthmatic bronchitis and severe cough crisis	disease	medicine (antibiotics)	subcutaneous emphysema
Markowitz- Spence 1987 [26]	F	12	B	OTO	recurrent swelling	otalgia, foul taste, erythema of the overlying skin, masseter muscle hypertrophy	Y		N	sialography, CT	sialography, CT		Valsalva motion with clenching	self-induced	medicine (antibiotics)	subcutaneous emphysema
Komori 1988 [27]	M	45	B	OTO	recurrent swelling	N	Y	Y	Y	CT, sialography, salivary	sialography, CT, salivary		Puffing out the cheeks strongly with his breath	self-induced	behavior modification	

										gland scintigraphy	gland scintigraphy					
David 1988 [28]	F	6.5	L	Pediatrics	swelling	intermittently warm, erythematous, tender		Y	Y	X-ray, CT	X-ray, CT		Habitually filling the left cheek with air and pressing on it forcefully with the fist, attempting to suppress frequent cough	abnormal habit	medicine (antibiotics), percutaneous evacuation, psychotherapy	
Brodie 1988 [29]	M	14	R	OTO	recurrent swelling	subcutaneous emphysema in the right face	Y	Y	Y	CT	CT		causing swelling by increasing intraoral pressure	self-induced	surgery (transposition of the duct)	subcutaneous emphysema
Telfer 1989 [30]	M	29	R	OMS	sqelching noise and feeling	N		Y	Y	X-ray, US, sialography	sialography	X-ray, US	idiopathic	idiopathic	surgery (transposition of the duct)	
Yamashita 1990 [31]	M	40	B	OTO	swelling	N				CT, US, sialography	CT, US, sialography		massage in the periauricular region	other	behavior modification	subcutaneous emphysema
Mandel 1991 [32]	M	53	R	OMS	recurrent swelling and mild pain	tenderness	Y	Y	Y	sialography	sialography		a habit of blowing out the cheek	abnormal habit	behavior modification	
Piette 1991 [33]	F	34	R	OMS	swelling and sharp pain	N		Y		X-ray	X-ray		air syringe used during dental treatment	iatrogenic (dental treatment)	medicine (antibiotics)	
Takenoshita 1991 [6]	M	24	L	OMS	"sqelching" or "squeaking noise," swelling	painful sensation		Y	N	US	US		flashing the air syringe between the tray with hardened alginate impression	iatrogenic (dental treatment)	medicine (antibiotics)	subcutaneous emphysema
Krief 1992 [34]	M	10	B	OTO	swelling, pain			Y	N	CT, sialography	CT, sialography		a habit of forcefully blowing out the cheeks	abnormal habit	medicine (antibiotics), behavior modification	
Curtin 1992 [35]	M	36	B	OTO	recurrent swelling	N	Y	Y		sialography, X-ray, US	sialography, X-ray, US		performing a Valsalva maneuver with an open glottis and nose occluded in	self-induced	behavior modification	

													an attempt to clear the ears			
Ferlito 1992 [36]	M	14	B	OTO	recurrent swelling, pain	N	Y	N	sialography, X-ray, US	X-ray, US	sialography	nervous tic consisting of his puffing out the cheeks with closed lips	self-induced	medicine (antibiotics, anti- inflammatory drug, corticosteroids) → no effect		
Terahara 1992 [37]	M	9	B	PDES	recurrent swelling	emphysema in the face and neck	Y	Y	Y	sialography, CT	sialography, CT	blowing the cheeks	self-induced	behavior modification	subcutaneous emphysema	
Yonetsu 1993 [38]	M	64	L	OMS	swelling	N		Y	X-ray, CT	X-ray, CT		idiopathic	idiopathic	refusal of treatment	subcutaneous emphysema	
Birzgalis 1993 [39]	M	16	R	OTO	pain, swelling	subcutaneous emphysema of the face and neck		N	X-ray, CT	X-ray, CT		elevating skin flap at will by a Valsalva maneuver	self-induced	medicine (antibiotics), behavior modification	subcutaneous emphysema, pneumomediastinum	
Cook 1993 [40]	F	44	B	OMS	chronic swelling	N	N	N	X-ray, sialography	sialography	X-ray	increased intraoral pressure needed for respiration during coughing attacks	disease			
Nassimbeni 1995 [41]	M	12	B	OTO	recurrent swelling	subcutaneous emphysema	Y	Y		sialography, CT, X-ray	CT	sialography, X-ray	blowing it up and deflating it	self-induced	psychotherapy	subcutaneous emphysema
	M	9	R	OTO	recurrent swelling	pyopneumopar otitis	Y			sialography, X-ray, US	X-ray, US	sialography	inflating and deflating the parotid at will	self-induced	aspiration, medicine(antibiotics), surgery	
Goguen 1995 [42]	M	9	R	PDES	swelling	N		Y	CT	CT		blowing hard against the palm	self-induced	medicine(antibiotics), behavior modification		
	F	9	B	PDES	recurrent swelling		Y	Y		sialography, CT	sialography, CT		a habit of repeatedly blowing up the parotid gland by Valsalva's maneuver with a closed mouth	abnormal habit	medicine(antibiotics), massage → behavior modification, surgery	

	M	13	B	PDES	recurrent swelling		Y		Y	sialography, X-ray	X-ray	sialography	blowing up his cheeks, which always occurred on Sunday afternoons and possibly a maneuver to avoid school	self-induced	medicine (corticosteroids, antibiotics), psychotherapy	
Nakamura 1996 [43]	M	10	B	OTO	recurrent swelling, pain	emphysema in the temporal region	Y	Y	N	X-ray, CT, sialography	X-ray, CT, sialography		self-inflating the parotid gland	self-induced	medicine(antibiotics) →medicine(corticosteroids), behavior modification	subcutaneous emphysema
Eligi 1997 [44]	M	50	L	OTO	recurrent swelling, pain		Y		N	X-ray, panoramic dental X-ray, US, CT	US, CT	X-ray, panoramic dental X-ray dental	idiopathic	idiopathic	medicine (antibiotics)	
Barthold 1998 [45]	F	18	B	OTO	recurrent swelling	subcutaneous emphysema of the neck	Y	Y	Y	US, sialography, CT, MRI	US, sialography, CT, MRI		Valsalva's maneuver	self-induced	medicine (antibiotics), aspiration	subcutaneous emphysema
Gudlaugsson 1998 [46]	F	16	B	Internal medicine	recurrent swelling, tenderness	subcutaneous emphysema, pneumomediastinum	Y	Y		CT	CT		a habit of biting the lower lip and whistling with a high-frequency sound	abnormal habit	behavior modification	subcutaneous emphysema, pneumomediastinum
Alcalde 1998 [47]	M	29	R	OMS	pain, swelling	bilateral tinnitus, headache		Y	Y	CT, sialography	CT, sialography		trauma to the head and maxillofacial region	disease	needle aspiration, medicine (NSAIDs, antibiotics) →refuse further treatment	
Leuwer 1998 [48]	M	25	L	OTO	painless swelling	N		Y		CT	CT		cheek puffing	self-induced		
Golz 1999 [49]	M	10	B	OTO	recurrent swelling	N	Y	N	N	CT	CT		holding the nose and mouth and blowing out the cheeks whenever he did not go to school	self-induced	psychotherapy	

Sittel 1999 [50]	F	14	B	OTO	recurrent swelling	N	Y		Y	MRI	MRI		puffing the cheeks whenever the itching became unbearable	self-induced	medicine (antibiotics), behavior modification	
Kirsch 1999 [51]	M	41	L	Internal medicine	swelling	sense of fullness without pain		N	N	CT	CT		spirometry; sometimes producing facial swelling at will by coughing or blowing forcefully against the closed mouth	iatrogenic(spirometry)		
Martin-Granizo 1999 [52]	F	5	B	Pediatrics	recurrent swelling	N	Y			X-ray, US, CT	CT, US	X-ray	idiopathic	idiopathic	medicine (antibiotics), hydration, warm compresses	
	F	8	R	Pediatrics	recurrent swelling, pain	N	Y	Y		sialography CT	CT	sialography	excessive intra oral pressure provoked by repeated spasms of coughing	disease		
Huang 2000 [53]	M	50	B	OTO	postnasal drainage, nasal congestion	N			N	CT	CT		idiopathic	idiopathic	observation	
Yokoyama 2001 [54]	M	9	B	Pediatrics	recurrent swelling, pain	subcutaneous emphysema in the left face and neck	Y	Y	Y	X-ray, CT	X-ray, CT		idiopathic	idiopathic	medicine (antibiotics)	subcutaneous emphysema
Cho 2001 [55]	M	42	L	OTO	swelling	N		N	Y	CT, sialography	CT, sialography		Trumpet playing with puffed cheeks	wind instruments (trumpet)	behavior modification	
Franco 2002 [56]	F	10	L	OTO	swelling	subcutaneous emphysema in the left neck			N	CT	CT		nervous tic, auto insufflation	self-induced	medicine (antibiotics, NSIADs), behavior modification	subcutaneous emphysema
Brasseur 2003 [57]	F	31	B	ER	neck swelling	eyelid edema, dysphagia, cervical and facial subcutaneous		Y	Y	CT, US	CT, US		Self-induced	self-induced	medicine (antibiotics, NSIADs, neuroleptic, antidepressant, anxiolytic)	subcutaneous emphysema, pneumomediastinum

						emphysema										
Orabi 2004 [58]	F	21	B	OTO	recurrent painful bilateral diffuse parotid swelling		Y	N		X-ray, CT, sialography, US	X-ray, CT, sialography, US		Self-induced	self-induced	psychotherapy	subcutaneous emphysema
Han 2004 [59]	M	13	R	OTO	recurrent swelling	subcutaneous emphysema in the face and neck	Y	Y	N	CT	CT		idiopathic	idiopathic	medicine (antibiotics), surgery (ductal ligation)	subcutaneous emphysema,pneumo mediastinum
Apaydin 2004 [60]	M	50	L	ENT	recurrent swelling		Y	Y	N	CT, MRI	CT, MRI		idiopathic	idiopathic	surgery	
Maehara 2005 [61]	M	15	B	OTO	recurrent swelling, tenderness	N	Y			CT	CT		a habit of blowing out his cheeks	abnormal habit	behavior modification	
De Meerleer 2005 [62]	F	20	B		recurrent painful swelling		Y	Y	Y	CT	CT		idiopathic	idiopathic	medicine (antibiotics), surgery (repositioning of both parotid ducts)	
Grainger 2006 [63]	F	12	B	ENT	recurrent swelling, pain		Y	Y		sialography, CT	CT	sialography	idiopathic	idiopathic	medicine (antibiotics) →surgery required but refused	
Paskoy 2006 [64]	M	38	B	ENT	swelling			N		US, CT	US, CT		induced by the Valsalva technique	self-induced	behavior modification	
Scherr 2006 [65]	M	34	R		swelling, cutaneous hypoesthesia			Y		US, CT	US, CT		blowing out the fanfare	wind instruments (fanfare)	medicine (antibiotics)	subcutaneous emphysema
Adachi 2006 [66]	M	59	R	Pediatrics	swelling	subcutaneous emphysema in the face and neck		Y	Y	CT, X-ray	CT, X-ray		a habit of repeatedly blowing out the mouth	abnormal habit	medicine (antibiotics)	subcutaneous emphysema
Yang 2007 [67]	F	10	B	OTO	swelling	subcutaneous emphysema in the neck		Y	Y	US, CT	CT	US	playing flute	wind instruments	medicine (antibiotics), needle aspiration	subcutaneous emphysema, pneumomediastinum

Chun 2007 [68]	M	18	B	ER	shortness of breath, chest pain, swelling	subcutaneous emphysema in the neck and face			Y	CT	CT		Self-induced to ease his work while he was in prison.	self-induced	medicine (antibiotics), behavior modification	subcutaneous emphysema, pneumomediastinum, pneumothorax
Balasubramanian 2008 [69]	M	11	B	Pediatrics	recurrent swelling	left parotid swelling with subcutaneous emphysema extending up to the orbit	Y	Y	N	CT, sialography	CT, sialography		induced by the Valsalva technique	self-induced	psychotherapy	subcutaneous emphysema
Núñez 2008 [70]	F	28	L	OTO	swelling	cracking on palpation		Y		X-ray, CT	X-ray, CT		induced by the Valsalva technique	self-induced	massage	
Laucis 2008 [71]	M	11	R	OMS	pain, swelling	cracking on palpation		Y	Y	X-ray, CT	CT	X-ray	a habit of blowing out his cheeks	abnormal habit	medicine (antibiotics), massage	subcutaneous emphysema
Joo 2008 [72]	M	20	L	OTO	swelling	heating sensation of left cheek, bilateral hearing impairment, click sound		Y	Y	CT	CT		lifting of heavy luggage ?	idiopathic	medicine (antibiotics), massage→surgery (ductal ligation)	subcutaneous emphysema
Prabhu 2008 [73]	M	12	B		recurrent swelling		Y			CT	CT		repeated blowing his cheeks	self-induced	medicine(antibiotics), massage	
Faure 2009 [74]	M	9	L	OTO	recurrent swelling		Y	Y	Y	CT	CT		puffing his cheeks in stressful situation	self-induced	medicine(antibiotics), massage	subcutaneous emphysema, pneumomediastinum
Mukundan 2009 [75]	M	13	L	Pediatrics	swelling, pain	tenderness		N	Y	CT	CT		playing the tuba	wind instruments (tuba)	medicine (antibiotics) →surgery (ductal ligation)	subcutaneous emphysema
Lee 2009 [76]	M	21	L	OTO	recurrent swelling		Y	Y	Y	CT	CT		habitually inflating his cheeks	abnormal habit	medicine (antibiotics, NSAIDs), behavior modification	

Moëne 2009 ^[7]	M	13	R	Pediatrics	swelling	tenderness				US	US		repeatedly chewing gum and blowing balloons for many hours	blowing balloons	medicine (tranquillizer)	
	M	10	R		swelling, pain	N				US	US		blowing lots of balloons	blowing balloons	medicine (tranquillizer)	
	F	5	L	ER	swelling, pain	tenderness				US	US		repeatedly submerging in the pool to make " bubbles", for what witch she kept the air in the oral cavity before getting the water	other		
	F	9	R	ER	swelling, pain					US	US		playing wooden flute	wind instruments (flute)		
Kyung 2010 ^[77]	F	7	B	ER	extensive edema of the face and neck, pain	subcutaneous facial and cervical emphysema		N		X-ray, CT	X-ray, CT		blowing into the recorder	wind instruments (recorder)	medicine (analgesics, antibiotics), behavior modification, analgesics	subcutaneous emphysema, pneumomediastinum
Lasboo 2010 ^[78]	M	41	B		pressure, pain			Y		sialography, CT	sialography, CT				medicine (antibiotics)→massage	
Fukuta 2011 ^[79]	M	34	B	ENT	swelling, a sense of malaise			Y		panoramic dental X-ray, CT, MRI, US	CT, MRI, US	panoramic dental X-ray	habitually puffing the cheeks	abnormal habit	behavior modification	subcutaneous emphysema
van Ardenne 2011 ^[80]	F	7	B	OTO	swelling			N	N	CT	CT		a habit of blowing out her cheeks, especially in stressful situations	abnormal habit	behavior modification	
Iwaki 2011 ^[81]	M	20	R	OTO	swelling			Y	Y	MRI, CT	CT	MRI	a habit of blowing out her cheeks,	abnormal habit	behavior modification, massage	
Vasi 2011 ^[82]	M	30	B	Internal medicine	facial pain and swelling			Y		CT	CT		Self-induce	self-induced	medicine (antibiotics)	subcutaneous emphysema
Zuchi 2011 ^[83]	F	50	L		pain, swelling	temporary local edema and otalgia				US, CT	US, CT		idiopathic	idiopathic	medicine (antibiotics)	

Ghanem 2011 [84]	F	46	L	OMS	discomfort, recurrent swelling	N	Y	Y	Y	US, sialography	US, sialography		idiopathic	idiopathic		
Tachibana 2012 [85]	M	7	L	PDES	recurrent swelling, tenderness	subcutaneous emphysema	Y	Y		CT	CT		puffing out the cheeks	self-induced	medicine (antibiotics), behavior modification	subcutaneous emphysema
Kitahara201 2 [86]	F	5	R		recurrent swelling		Y			CT	CT				medicine (antibiotics)	
Li 2012 [87]	M	18	L	OMS	swelling for more than 6 months			N	Y	CT	CT		facial trauma	disease	medicine (antibiotics)→ refuse further treatment	
Ojiri 2012 [88]			L							CT	CT					
McCormick 2013 [89]	M	7	B	OTO	recurrent swelling	tenderness	Y			CT	CT		idiopathic	idiopathic	medicine (NSAIDs), warm compresses, massage	
Potet 2013 [90]	F	44	L		swelling, pain, slight fever					US, MRI, CT	US, MRI, CT		idiopathic	idiopathic	medicine (antibiotics)	
McGreevy 2013 [91]	M	48	B	OTO	recurrent swelling, pain	repeated infection of the gland	Y	Y	Y	CT	CT		self-insufflating both parotid glands by expiring against a closed mouth	self-induced	surgery	
Nicot 2013 [92]	M	8	R	OMS	recurrent swelling	N	Y		N	CT	CT		dive holding breath	other	behavior modification	
Watanabe 2014 [93]	M	52	R	OMS	pain, swelling			N	Y	CT	CT		dental treatment with air syringe	iatrogenic (dental treatment)	medicine (antibiotics)	
Almarío Hernández 2014 [9]	M	7	L	ER	swelling			Y		US		US	blowing balloon	blowing balloons	medicine (antibiotics)	subcutaneous emphysema
Konstantinid is 2014 [94]	M	61	B	OTO	recurrent swelling		Y	N	Y	CT	CT		idiopathic	idiopathic	sialendoscopy and irrigation with steroids	
Ino 2015 [95]	M	40	B	OTO	pain, swelling	fever, cough		N	Y	CT	CT		suppressing a cough	disease	medicine (antibiotics)	

	F	61	R	OTO	pain in the right parotid			N	N	CT (puffed up mouth)	CT		puffing out the cheeks	self-induced	medicine (minor tranquilizer), behavior modification	
	M	24	R	OTO	swelling, lost his voice (hypertonic vocalization)			N	N	CT (puffed up mouth)	CT		puffing out the cheeks	self-induced	medicine (antibiotics, minor tranquilizer)	subcutaneous emphysema
	M	15	R	OTO	recurrent swelling		Y	Y	N	CT	CT			self-induced		
	F	52	R	OTO				Y	Y	CT	CT		puffing out the cheeks	self-induced		
	F	33	R	OTO	feeling of ear fullness			N	Y	CT	CT		puffing out the cheeks for feeling of ear fullness by psychosomatic physician's advice	iatrogenic (psychosomatic physician's advice)		
	M	56	L	OTO				Y	Y	CT	CT			self-induced		
	M	17	R	OTO				N	N	CT	CT			self-induced		
Dietrich 2015 [96]	M	33	R	ER	swelling, tenderness			Y	N	US, CT	CT	US	blowing balloon	blowing balloons	behavior modification	
Bowden 2015 [97]	M	4	L		face and neck swelling, pain	cervicofacial subcutaneous emphysema		Y		X-ray	X-ray		blowing balloon	blowing balloons	behavior modification	subcutaneous emphysema
Cabello 2015 [98]	M	42	R	Internal medicine	swelling, pain, tenderness			Y		US, CT	US, CT		the blowing and whistles at night related to the MAD	iatrogenic (dental appliances)	medicine (NSIADs)	
Osawa 2015 [99]	M	11	B	OTO	recurrent swelling, pain	emphysema in the face and neck pneumomediastinum	Y	Y	N	X-ray, CT	X-ray, CT		temporary increase in oral pressure by vomiting	disease	medicine (antibiotics), behavior modification	subcutaneous emphysema, pneumomediastinum
Shibata 2016 [100]	M	6	L	OTO	pain, swelling				Y	CT	CT		habitually puffing the cheeks	abnormal habit	medicine (antibiotics), behavior modification	
	F	43	L	OTO	pain, swelling	numbness in left cheek				CT	CT		idiopathic	idiopathic	medicine (antibiotics), behavior modification	

Abdullayev 2016 ^[8]	M	36	B		painless swelling					US	US		non-invasive CPAP, bronchodilator therapy	iatrogenic (CPAP)	medicine (antibiotics)	
Lagunas 2017 ^[101]	M	13	B	OMS	swelling					CT	CT		Self-induced	self-induced	medicine (antibiotics, NSIADs), behavior modification	subcutaneous emphysema
Alnes2017 [102]	F	10	L	OTO	swelling, pain, redness of the skin					US, CT	CT	US	blowing on a paper trumpet and sucking on water bottles	wind instruments (trumpet)	medicine (antibiotics), fine needle aspiration.	subcutaneous emphysema
Oh2017 ^[103]	F	21	B	OTO	pain, recurrent swelling	redness	Y	Y	Y	CT	CT		habitually puffing the cheeks	abnormal habit	behavior modification	
Lee 2017 [104]	M	11	B	ER	pain, swelling	trismus		N	Y	X-ray, US, CT	CT	X-ray, US	idiopathic	idiopathic	medicine(antibiotics)	subcutaneous emphysema, pneumomediastinum
Kwon 2017 [105]	F	38	L	OTO	recurrent swelling	N	Y	Y	Y	CT	CT		repeated behavior of insufflation	self-induced	behavior modification, massage	subcutaneous emphysema
Takenouchi 2017 ^[106]	M	45	R	OMS	the crepitation of around the right parotid gland			Y		CT	CT		the habit of blowing out his cheeks	abnormal habit	behavior modification	
Yamazaki 2017 ^[107]	M	53	B	OMS	complaint of oral noises	N		Y	Y	CT, sialography	CT, sialography		the habit of compressing the buccal region	abnormal habit	behavior modification	
Futai 2018 [108]	F	5	R	OTO	recurrent swelling, pain		Y		N	CT, sialography	sialography	CT	wind instruments and balloons	wind instruments and balloons	behavior modification	
Goates 2018 [12]	M	53	L		swelling	foul-tasting, thick mucus draining into his mouth			Y	panoramic dental X-ray, CT	CT	panoramic dental X-ray	CPAP(full-face) for 5 years	iatrogenic (CPAP)	the change to nasal CPAP	
	M	54	R		recurrent swelling		Y		Y	panoramic dental X-ray, MRI, US	US	MRI, panoramic dental X-ray	CPAP(full-face) for 10 years	iatrogenic (CPAP)	medicine (antibiotics), the change to nasal CPAP	
Paterson	M	24	L	OMS	swelling					CT	CT		idiopathic	idiopathic	needle aspiration with US	

2018 ^[109]																
House 2018 ^[110]	M	34	B	ER	recurrent sensations of a "pop", bilateral facial swelling, palpable crepitus of the head and neck	bipolar disorder	Y	Y		Barium swallow, CT;○,	CT		Self-induced to leave prison (the patient is a prison inmate)	self-induced	medicine (antibiotics, morphine), warm compress, massage, aggressive hydration	subcutaneous emphysema, pneumomediastinum
Miłoński 2019 ^[111]	M	54	L	OTO	swelling, pain					US, CT	US, CT		the habit of pushing his tongue into the left cheek	abnormal habit	conservative treatment (a pressure dressing) → surgery	subcutaneous emphysema
Ambrosino 2019 ^[112]	M	12	B	ER	recurrent cheeks swelling, pain		Y	Y	Y	CT	CT		idiopathic	idiopathic	medicine (antibiotics), massage	subcutaneous emphysema, pneumomediastinum
Basha 2019 ^[113]	M	40	R	OMS	discomfort in the right face	mild diffuse swelling and vague tenderness			Y	US, CT	CT	US	habitually puffing the cheeks	abnormal habit	behavior modification	
Raczkowska -Labuda 2019 ^[114]	M	12.5	B	OTO	swelling	parotitis		Y	Y	US, CT, sialography	US, CT, sialography		inflating both parotid glands	self-induced	medicine (antibiotics), behavior modification	subcutaneous emphysema
Kim 2019 ^[114]	M	67	L	OTO		N				CT(parotid mass follow-up 3years)	CT		idiopathic	idiopathic	observation	
Enami 2020 ^[116]	F	37	L	Dentistry	pain, swelling			N	N	panoramic dental X-ray, CT	CT	panoramic dental X-ray	dental care using an air syringe	iatrogenic (dental treatment)	medicine (antibiotics), behavior modification	
Yang 2020 ^[117]	M	30s	B	ER	pain, swelling	facial swelling, neck pain, dysphagia, odynophagia			Y	CT	CT		puffing out the cheeks to force air into the neck with subsequent decompression of air back into the oral cavity by pushing behind	self-induced	medicine (antibiotics) →additional treatment (details unknown)	

													the ear			
Sinha 2020 [10]	F	50	B	OMS	recurrent swelling		Y	Y	Y	US	US		habitually puffing the cheeks	abnormal habit	behavior modification	
Gazia 2020 [4]	M	45	L	OTO	painful swelling	subcutaneous emphysema		Y		CT	CT		idiopathic	idiopathic	medicine (antibiotics), psychotherapy	subcutaneous emphysema
Gray 2020 [118]	F	9	L	OTO	a large left-sided neck mass					CT	CT		blowing up her cheeks	self-induced	fine needle aspiration	
Aljeaid 2020 [119]	M	12	B	OTO	recurrent painless swelling	N	Y		N	CT	CT		the habit of balloon-blowing	abnormal habit	behavior modification	subcutaneous emphysema
Ohali 2020 [120]	M	14	L	OTO	recurrent swelling		Y	Y	Y	CT	CT		a habit of blowing the cheeks against a closed mouth	abnormal habit	behavior modification	
Fernandez 2020 [121]	M	25	R	OTO	a sensation and noise described as a "sponge crunching"			Y	Y	US, CT	US, CT		idiopathic	idiopathic	conservative measures (details unknown)	
Yoshida 2022 [122]	M	57	B	OTO	recurrent swelling, pain	N	Y	Y	Y	CT	CT		obstructive sleep apnea syndrome, wind instrument (hichiriki), air flight	disease, wind instruments	medicine (antibiotics), oral appliance	
Goncalves 2022 [11]	M	59	L	OTO					Y	US	US			idiopathic		
	M	28	R						Y	US	US			idiopathic		
	M	11	L						Y	US	US		wind instruments	wind instruments		
	M	56	R						Y	US	US			idiopathic		
	F	49	R						Y	US	US			idiopathic		
	M	64	R						Y	US	US			idiopathic		
	M	20	R						Y	US	US			idiopathic		

	M	56	L						Y	US	US			idiopathic		
	M	62	L						Y	US	US		blowing the nose with closed mouth	self-induced		
	M	71	L						Y	US	US			idiopathic		
	M	14	L						Y	US	US		wind instruments	wind instruments		
	F	40	L						Y	US	US			idiopathic		
	F	48	L						Y	US	US			disease		
	M	41	R						Y	US	US			iatrogenic		
	M	69	L						Y	US	US		surgical treatment of the distal duct system and a stent had been inserted	iatrogenic		
	M	49	R		recurrent swelling		Y		Y	US	US		surgical treatment of the distal duct system and a stent had been inserted	iatrogenic		
	M	73							Y	US	US		surgical treatment of the distal duct system and a stent had been inserted	iatrogenic		
	M	48							Y	US	US		surgical treatment of the distal duct system and a stent had been inserted	iatrogenic		
	M								Y	US	US		surgical treatment of the distal duct system and a stent had been inserted	iatrogenic		
	F								Y	US	US		surgical treatment of the distal duct system and a stent had been inserted	iatrogenic		
	M		B						Y	US	US		surgical treatment of the distal duct system and a	iatrogenic		

													stent had been inserted			
Kim 2022 [123]	F	7	L	PDES	swelling			N		CT	CT		habitual tic	abnormal habit	medicine (antibiotics), behavior modification	
Galletti 2022 [124]	M	45	L	ER	swelling, pain, crepitus			Y		CT	CT		psychiatric disorders	self-induced	medicine (antibiotics), psychotherapy	subcutaneous emphysema, pneumomediastinum
Barros 2022 [125]	M	13	L	ER	swelling, pain	tenderness		Y		CT	CT		blowing dozens of balloons	blowing balloons	medicine (antibiotics)	subcutaneous emphysema
Youner 2023 [126]	M	37	B	ER	the sudden onset of facial swelling	facial numbness, tingling, mild throat pain, odynophagia,		Y		CT	CT		inflating an air mattress	other	medicine (antibiotics)	subcutaneous emphysema, pneumomediastinum
Caudo 2023 [127]	M	45	L	ER	edema of the left parotid region and neck with crackles on palpation			Y		CT, X-ray	CT, X-ray		first episode begins after tooth extractions, in which the Stesene's duct was insufflated by air	iatrogenic	medicine (analgesics, steroids, antibiotics) → medicine (anti-inflammatories, antibiotics), behavior modification	subcutaneous emphysema
Yanagizono 2023 [128]	M	9	L	OTO	swelling, pain	tenderness, snow-grasping feel			Y	US, CT, X-ray	US, CT	X-ray	vomiting	disease	medicine(antibiotics), behavior modification	subcutaneous emphysema, pneumomediastinum
Ramsy 2023 [129]	F	10	B	ER	swelling			Y		X-ray	X-ray			idiopathic	medicine (antibiotics)	subcutaneous emphysema
Liangyu 2023 [130]	M	10	L	OMS	swelling		Y	N	N	MRI, sialography	MRI	sialography	involuntary check bulging behavior	abnormal habit	medicine (anti-inflammatories), psychotherapy, physical compression, fine needle aspiration →surgery	subcutaneous emphysema
Gool 2023 [131]	M	12	B	ER	pain, swelling	swelling of the face and neck and	Y	Y		CT, sialography,	CT	MRI, US		idiopathic	Medicine (antibiotics, corticosteroids)	subcutaneous emphysema,

						bilateral swelling of the eyelids				past sialography CT, two MRI's, US						pneumomediastinum
Kubota 2023	M	83	L	OS	swelling		Y	Y	Y	US, CT	US, CT			idiopathic	massage, behavior modification	

B, bilateral; CPAP, continuous positive airway pressure; CT, computed tomography; ER, emergency department; L, left; MRI, magnetic resonance imaging; N, No; NSAIDs, nonsteroidal anti-inflammatory drugs; OMS, oral and maxillofacial surgery; OS, oral surgery; OTO, Otolaryngology; PDES, pediatrics; R, right; US, ultrasound; Y, Yes
Blank fields are not filled in.