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Surgical learning curve in performing palatoplasty: A retrospective study in 200 patients

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ABSTRACT

Objectives: The aim of the study was to assess the influence of the experience of the surgeon on the occurrence of fistulas following palatoplasty.
Materials and methods: A retrospective review was performed of consecutive children treated between 2006 and 2013 for cleft palate by a single surgeon. Cleft palate repair was performed using the von Langenbeck technique, Furlow palatoplasty, buccal flap or Vomer flap. Data was collected for age, sex, date of birth, syndrome, adoption, cleft palate type, type of repair, cleft width, fistula occurrence and location of fistula.
Results: A total of 276 operations were performed in 200 children (Veau I, II, III, IV). Mean age at surgery was 21.9 months (range: 6.2 months to 26 years 8.3 months). Postoperatively, palatal fistulas occurred in eight patients (4.0%), however, the incidence was 3.0% in the non-adoption group and 9.7% in the adoption population. In this study there was no statistically significant evidence of a surgical learning curve, and no significant associations between fistula rate and sex, adoption, syndrome, cleft type, cleft width, or type of repair.
Conclusion and clinical relevance: This study demonstrates a fistula formation rate of 3.0% for the non-adoption population and 9.7% for the adoption population. There was no statistically significant evidence of a learning curve during the first few years of performing cleft palate repair. No other independent risk factors for postoperative fistula formation were identified; however, the benefit of a vomer flap and subsequent reduction in fistula incidence was demonstrated.

1. Introduction

The incidence of cleft lip and palate in the Netherlands ranges from 1.4 to 2.1 per 1000 births (Van den Berg et al., 1994). The inability to separate the naso-oropharyngeal cavities results in problems with feeding, middle ear disease and speech development (Rohrich et al., 1996). Subsequently, primary objectives in the surgical repair of a cleft palate are the development of normal speech, hearing and feeding, with minimal maxillary growth restriction (Phua and de Chalain, 2008; Losken et al., 2011). One of the complications of palatoplasty is the occurrence of fistulas. Not only will cleft palate fistulas result in feeding and possible speech problems and influence maxillary growth, but the secondary surgery will also have financial consequences.

A cleft palate fistula is defined as a failure of healing or a breakdown in the primary surgical repair of the palate (Muzaffar et al., 2001). Studies over the last 15 years show an incidence of fistulas after palatoplasty with a range of 0–58% (Table 1) (Lin et al., 1999; Mackay et al., 1999; Schendel et al., 1999; Muzaffar et al., 2001; Wilhelmi et al., 2001; Yu et al., 2001; Rosenstein et al., 2003; Sommerlad, 2003; Henkel et al., 2004; Jackson et al., 2004; LaRossa et al., 2004; Bekerecioglu et al., 2005; Inman et al., 2005; Savaci et al., 2005; Agrawal and Panda, 2006; Helling et al., 2006; Mak et al., 2006; Richard et al., 2006; Hassan and Askar, 2007; Holland et al., 2007; Andersson et al., 2008; Andrades et al., 2008; Bindingnavele et al., 2008; Khosla et al., 2008; Losee et al., 2008; Phua and de Chalain, 2008; Koh et al., 2009; Murthy et al., 2009; Parwaz et al., 2009; Shi et al., 2009; Stewart et al., 2009; Sullivan et al., 2009; Ferdous et al., 2010; Hodges, 2010; Landheer et al., 2010; Lu et al., 2010; Saleh, 2010; Agrawal and Panda, 2011;

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Table 1
Studies from 1999 to 2014: overall fistula incidence after palatoplasty.

Article author (date)	Type of repair	Cleft types	Study size (*n*)	One stage (%)	Two stage	Overall fistulas (%)
de Agostino Biella Passos et al. (2014)	Von Langenbeck	UCLP	589	27	–	27
Winters et al. (2014)	Furlow, the 2-flap palatoplasty, + alloderm	All	70	4.3	–	_4.3
Basta et al. (2014)	Furlow	All	132	1.0	15.2	4.5
Rossell-Perry et al. (2014)	Two-flap technique plus intravelar veloplasty	UCLP	152	8.6	–	8.6
Zhang et al. (2014)	Von Langenbeck, Veau-Wardill-Kilner, Furlow	All	2100	–	–	0.7
Lithovius et al. (2014)	Straight closure, Von Langenbeck, Vomer flap	All	136	9.6	–	9.6
Kahraman et al. (2014)	Furlow, Veau-Wardill-Kilner, rotation palatoplasty	All	167	17.7	–	17.7
Sullivan et al. (2014)	Two-flap technique	All	55	9.1	–	9.1
Black and Gampper (2014)	Technique of flap rotation	Veau II–IV	49	8.6	–	8.6
Abdurrazaq et al. (2013)	Langenbeck	All	64	29.8	–	29.8
Mahoney et al. (2013)	Furlow, Veau, von Langenbeck, hybrid, 'Other'	All	485	0.8	–	0.8
Becker and Hansson. (2013)	Sommerlad	All	175	6.3	–	6.3
Jackson et al. (2013)	Modified Furlow repair	All	869	5.2	–	5.2
Dec et al. (2013)	Oxford, Bardach, Von Langenbeck	UCLP/BCLP	178	0.71	–	0.71
Doucet et al. (2013)	Malek or Talman protocol	UCLP	40	–	27.5	27.5
Nadjmi et al. (2013)	Modified Furlow	All	40	–	0	0.0
Al-Nawas et al. (2013)	Single-step palatal closure	All	94	4.5	–	4.5
Friede (2012)	Two-stage	UCLP	50	–	6	6
Patel et al. (2012)	Not stated	HSCP/SCP	140	–	–	6.3
Koudoumnakis et al. (2012)	Two-flap technique	All	275	5.4	–	5.4
Gongorjav et al. (2012)	Two-flap, Furlow, two-stage, new modified technique	All	436	18.0	37.5	18.3
Annigeri et al. (2012)	Veau-Waldill-Kilner	All	30	20	–	20
De Buys Roessingh et al. (2012)	Malek procedure, one- and two-stage	All	71	–	–	19.7
Lam et al. (2012)	Furlow, Furlow + V–Y pushback	HSCP/SCP	67	3.0	–	3.0
Dong et al. (2012)	Furlow, two-flap	HSCP/SCP	88	0.0	–	0.0
Maine et al. (2012)	Not stated	All	510	–	–	15.1
Williams et al. (2011)	Furlow, Von Langenbeck	UCLP	459	18.0	–	18.0
Isik et al. (2011)	Rotation flap, Von Langenbeck, V–Y pushback	Veau I–III	28	7.1	–	7.1
Agrawal and Panda (2011)	One-stage	UCLP/BCLP	330	3.6	–	3.6
Losken et al. (2011)	Furlow, Von Langenbeck, Veau-Wardill-Kilner, Bardach two flap	All	126	1.6	–	1.6
Saleh (2010)	U-shaped flap	HSCP/SCP	30	0	–	0
Landheer et al. (2010)	One- or two-stage repair	All	275	14.0	27.0	21.0
Lu et al. (2010)	Sommerlad	All	176	7.0	–	7.0
Ferdous et al. (2010)	Vomerflap	UCLP	43	4.7	–	4.7
Hodges (2010)	Sommerlad	UCLP/BCLP	106	6.5	–	6.5
Shi et al. (2009)	Modified two-flap palatoplasty	HSCP/SCP	30	13.3	–	13.3
Sullivan et al. (2009)	Two-flap palatoplasty	All	449	2.9	–	2.9
Koh et al. (2009)	Classic/modified two-flap palatoplasty	UCLP	31	0	–	0
Parwaz et al. (2009)	Von Langenbeck, Veau-Wardil-Kilner	All	31	35	–	35
Murthy et al. (2009)	Two-flap palatoplasty	All	332	2.4	–	2.4
Andrades et al. (2008)	Two-flap palatoplasty	All	213	0.9	–	0.9
Losee et al. (2008)	Furlow	All	132	0.76	–	0.76
Bindingnavele et al. (2008)	Double-opposing Z-plasty with or with- out islandization	All	500	5.0	–	5.0
Phua and De Charlain (2008)	Veau, Von Langenbeck, Furlow	All	211	8.1	–	8.1
Andersson et al. (2008)	Von Langenbeck, Sommerlad	Secondary palate	814	4.0	–	4.0
Stewart et al. (2009)	Modified von Langenbeck	HSCP/SCP	182	0	–	0
Khosla et al. (2008)	Furlow Z-plasty	All	140	3.6	–	3.6
Holland et al. (2007)	Schwenkendiek repair, Von Langenbeck	UCLP	41/41	11	58	34.5
Hassan and Askar (2007)	Wardill-Kilner, Kriens	HSCP/SCP	70	14	–	14.0
Mak et al. (2006)	Furlow	All	57	14.0	–	14.0
Richard et al. (2006)	Von Langenbeck, Vomer flap	UCLP	47	–	13	13
Helling et al. (2006)	Furlow technique + AllodermTM	All	31	3.2	–	3.2
Agrawal and Panda (2006)	Vomer flap	All	678	2.95	–	2.95
Inman et al. (2005)	Wardill-Kilner, Von Langenback	All	148	4.7	–	4.7
Bekerecioglu et al. (2005)	Two or four flap technique	All	73	7	–	7
Savaci et al. (2005)	One-stage and two-stage	UCLP	41	21.1	27.3	24.4
Jackson et al. (2004)	Buccal flap	All	156	3.6	–	3.6
LaRossa et al. (2004)	Furlow double-opposing Z-palatoplasty	All	261	6.8	–	6.8
Henkel et al. (2004)	Wave-line technique and intravelar veloplasty	SCP	24	0	–	0
Sommerlad (2003)	Sommerlad	All	285	15	–	15
Rosenstein et al. (2003)	Not stated	UCLP/BCLP	82	–	–	29.3
Muzaffar et al. (2001)	Von Langenbeck, Wardill-Kilner, 'Other'	All	103	–	8.7	8.7
Wilhelmi et al. (2001)	Two-flap technique	All	119	3.4	–	3.4
Yu et al. (2001)	Furlow and von Langenbeck	HSCP/SCP	96	3.1	–	3.1
Mackay et al. (1999)	One-stage and two-stage	All	374	–	–	11.5
Schendel et al. (1999)	One-stage Delaire palatoplasty	All	95	0	–	0
Lin et al. (1999)	Levator retropositioning and double-opposing Z-plasty	All	24	12.5	–	12.5

BCLP: bilateral cleft lip and palate; HSCP: hard and soft cleft palate; SCP: soft cleft palate; UCLP: unilateral cleft lip and palate.