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The Language Abilities of Cantonese-speaking Children with Cleft Palate: A pilot study

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Abstract

This study aimed at determining if Cantonese-speaking children with cleft palate demonstrated language delays and to explore an efficient and effective way to assess language abilities in this population. Twenty non-syndromic Cantonese-speaking children with cleft palate were given the Reynell Developmental Language Scale (Cantonese Version), the Hong Kong Cantonese Receptive Vocabulary Test and the Cantonese Segment Phonology Test. Five children who met the age requirement received the Cantonese form of the Chinese Communicative Development Inventory: Words and Sentences. The results suggested that Cantonese-speaking children with cleft palate were at high risk of having a language delay, leading to discussions of the possible etiology and the importance of further research in this area. Correlations between individual tests were also investigated.

Introduction

A remarkable number of studies and researches have been done on children with clefts. These studies primarily focused on their articulation, resonance and phonetic abilities. However, little attention was paid on language development. It is important to know if children with cleft palate have a higher incidence of language problems and it is important to develop a protocol to evaluate their language abilities efficiently and effectively at an early stage of language development.

The first query on language abilities of children with cleft palate is whether they have language problems. In earlier studies, there were different points of view on the language development of children with clefts, especially in the area of receptive language ability. Morris (1962) studied 107 children with clefts from two to fifteen years old and compared their performance with non-cleft peers. The study revealed that significant impairment was found in both receptive and expressive language measures in the children with clefts. This was supported by later study that 137 children with clefts aged three to six years old were compared with their non-cleft peers and they showed poorer vocabulary and pervasively delayed expressive and receptive language skills (Philips and Harrison, 1969). However, Bzoch (1979) claimed that children with clefts at the age of two demonstrated expressive language delay while their receptive language was normal. This controversy on the language abilities of children with clefts thus provides a great area for investigation.

Another important area to look at is the characteristics of language development in children with clefts. Children with clefts demonstrated shorter mean length of utterance and reduction in both structural complexity and the variety of words used (Morris, 1962). Nation (1970) found that children with clefts had poorer vocabulary comprehension and poorer use of vocabulary. More recent studies revealed increasing evidence that children with clefts have a high occurrence of a wide range of receptive and expressive language impairment, particularly in expressive language (Morris & Ozanne, 2003; Scherer, 1995; Scherer & D'Antonio, 1995). Scherer and D'Antonio (1995) confirmed that children with cleft lip and palate demonstrated expressive language delay and found that poor intelligibility was a possible cause for the reduction of language complexity. It was also found that children with cleft lip and palate demonstrated delayed onset of vocabulary acquisition and mean length of utterance, and children with clefts demonstrated poor expressive and receptive language ability through 30 months of age (Scherer and D'Antonio, 1997; Scherer, D'Antonio & Kalbfleisch, 1999). Based on previous studies, a number of linguistic deficits have been found in children with clefts, particularly preschool-aged children. In particular, deficits in early expressive vocabulary and syntax were observed. Contradictory findings have been found on the later language development of children with clefts. Chapman, Graham, Gooch & Visconti (1998) suggested that children with clefts would outgrow their language problems as they entered school while Eliason & Richman (1990) claimed that preschool-aged children

with clefts demonstrated difficulty in tasks requiring memory, associative reasoning and categorization, suggesting that more research is needed on the language abilities of preschool-aged children with clefts in later language development.

The causes of having language delay in children with clefts are largely unknown due to limited studies. It is believed that children with clefts and non-cleft children are prone to the same possible developmental problems, but children with clefts are at a higher risk to have speech and language deficits due to additional risks that cannot be ignored (Peterson-Falzone, Hardin-Jones & Karnell, 2000). According to Stengelhofen's view (1993), the risk factors could include sensory impairment in particular hearing impairment, anatomical problems in peripheral speech mechanism, neurological factors, cognitive factors and psychosocial factors. Children with clefts are prone to high incidence of middle ear disease (Peterson-Falzone et al., 2000). Hearing impairment could be resulted which had significant impact on speech and language development (Stengelhofen, 1993). There were controversial arguments on the correlation between conductive hearing loss and delays on cognitive and language development for years (Kuehn & Moller, 2000), but Peterson-Falzone et al. (2000) concluded that children with syndromes and hearing impairment were particularly at risk for language impairment. Craniofacial structural deviations caused by clefting often resulted in phonetic-based disorder which was often claimed to be related to overall expressive language delay (Chapman, 1993). The abnormal speech mechanisms at

birth could have altered feeding, early speech and social interactions and expectations at home, resulting in delays in speech and language development (Bzoch, 2004). In addition, neurolinguistic deficits identified in syndromes associated with clefting may cause receptive and expressive language delays or disorders (Witzel, 1995). Cognitive impairment could be the cause of speech and language development in the population. Controversy was found in the cognitive ability of children with clefts which could range from within the normal range to having a specific language or learning disability and even to severe mental retardation which language delays could be resulted (Stengelhofen, 1993). Psychosocial factors could also play a role in the speech and language development of children with clefts. Parent-child interaction might be different from non-cleft children since parents of children with clefts might be anxious and overprotective. They might have less reinforcement in communication effort due to unclear speech or even give fewer chances to the children in communication interaction. Consequently, language stimulation to the children might be curtailed. Besides, hospitalization period during surgical repair of clefts might interrupt the period of normal experience or language exposure as in other non-cleft children. All these factors could discourage children with clefts from expressing themselves and thus result in expressive language delay. In addition, speech problems could possibly play a significant role in speech and language development of children with clefts but the relationship between them is largely unknown due to limited studies. Palatal clefts could influence children in speech productions

in various ways, including problems in resonance, articulation and phonation (Witzel, 1995). Children with clefts were reported to have difficulty in organizing and representing the sound units and system of language (Witzel, 1995). Articulation problems could lead to less talking of children with clefts, resulting in a reduced number of verbal output and vocabulary size, which consequently lead to a delay in expressive language ability (Morris, 1962). Chapman, Hardin-Jones & Halter (2003) studied 15 children with cleft palate at 21 months old and found that those who produced more true stops would have a better consonant and lexical development when compared with non-cleft peers. Further studies are needed on the relationship between speech problems and language problems experienced by children with clefts who produced less true stops.

One point to consider is how to assess speech and language abilities of children with clefts effectively and efficiently. This could lead to the development of a protocol for diagnostic purpose and for screening at-risk group of having language impairment in children with clefts. Evaluation of language abilities of children with clefts does not differ from the non-cleft peers (Peterson-Falzone et al., 2000). A comprehensive assessment of language abilities typically includes combination of standardized language tests, criterion-referenced procedures and behavioral observations. Standardized tests could identify the presence of language delay or disorder. It could reflect the language age and predict later performance of the child in a comprehensive way, but the standardized procedure might constrain the child’s

performance in the test, so criterion-referenced procedures and behavioral observations are suggested to be included in the evaluation protocol. Furthermore, increasing number of studies used parent questionnaire as one of the screening tool for language development of children. Parent questionnaire has been used in studying children with clefts and together with analysis of language sample, the results showed that they acquired language skills with a slower onset and in a slower pace (Broen, Devers, Doyle, Prouty & Moller, 1998), especially in vocabulary acquisition which was consistent with previous findings. Although there has been disinclination in using parent report as a language assessment tool due to criticisms of attaining an accurate report from parents, parent questionnaire showed several inherent advantages in acting as a language screening tool (Dale, 1991). Parent questionnaire could reflect the child's ability in daily situations whereas language sample obtained in clinical setting could only reflect what the child usually uses (Bates, Bretherton & Snyder, 1988), providing a more representative information. In addition, performance factor such as word frequency would affect the result less (Dale, 1991). It would be less time consuming in administration and interpretation of results when compared with using standardized tests and language sampling as assessment tools. Parent questionnaire was proven to be a good measure of language development at which it demonstrated high validity in measuring vocabulary and syntactic development (Dale, 1991; Scherer & D'Antonio, 1995). Besides, it was also proven to have high correlations with standardized test (Poon, 1999).

Only a few studies have been done in the area of articulatory error patterns, nasality and intelligibility of speech produced by Cantonese-speaking children with cleft palate (Chun & Whitehill, 2001; Stokes & Whitehill, 1996; Whitehill, Francis & Ching, 2003). There has been no research done on language abilities in Cantonese-speaking children with cleft palate. This lead to a query on the universality of having receptive and expressive language delays in children with cleft palate, as suggested by previous studies on English-speaking children. As Cantonese and English are two individual and unique language systems, children speaking Cantonese and English might undergo different language development. Studying language abilities of Cantonese-speaking children with cleft palate might extend our knowledge on the universality of language abilities of children with cleft palate. It also implied a significant clinical value for clinical practice in Hong Kong. Specifically, this study aims at answering the following research questions: a) Do Cantonese-speaking children with cleft palate have receptive and expressive language impairments? b) How to evaluate the language abilities efficiently and effectively so that language delay or high-risk groups of Cantonese-speaking children with clefts can be identified easily?

Methodology

Subjects

Twenty non-syndromic children with cleft palate between 22 and 83 months of age participated in this study with a mean age of 50.7 months. Nine girls and eleven boys

participated in this study. Cleft types was distributed, with fourteen children having cleft lip and palate, four children having cleft palate only and two children having submucous cleft palate. Eight children with cleft palate were recruited from the Hong Kong Association for Cleft Lip and Palate, eleven children recruited from the Cleft Lip and Palate Centre at Prince Philip Dental Hospital of The University of Hong Kong and one child recruited from private clinic. Criteria for exclusion were adopted from Scherer and D'Antonio (1995) and were set as follows: 1) The child demonstrates genetic syndrome. 2) The child has sensorineural hearing loss. 3) Family language not in Cantonese.

Procedures

Each child was given a language assessment on both receptive and expressive language and a speech assessment on single word production after hearing screening. Administration of a parent questionnaire, the Cantonese form of the Chinese Communicative Development Inventory: Words and Sentences (Tardif, Fletcher, Zhang & Liang, in press) was given to a subset of subjects who met the age requirement.

Hearing Screening

Distortion product otoacoustic emissions (DPOAEs) test was used in hearing screening of this study. Otoacoustic emission (OAE) tests are used to determine cochlear status, particularly hair cell function for hearing screening. OAE tests are suitable for newborn infants and young kids as no behavioral response is required. DPOAEs are produced

when sounds with two slightly different pure tone frequencies simultaneously stimulate the cochlea. The responses would be measured to discriminate normal hearing and hearing loss. In this study, four frequencies of sounds (5000, 4000, 3000 & 2000 Hz) were presented to each child, the child's OAE response was compared to normalized data by Gorga et al. (1997). The child has to meet the response conditions defined for a pass, which is less than pure tone audiometric threshold of 25 dB HL at a particular frequency, in three out of the four frequencies tests to get an overall pass result in the DPOAEs test. Despite the fact that five of the subjects failed in one of the frequencies, all subjects in this study met the passing criteria and got overall pass results in the hearing screening.

Speech and Language Assessments

Standardized tests were used to assess the child's receptive and expressive language ability using the Reynell Developmental Language Scale (Cantonese Version) (RDLS) (Reynell, 1983) and the Hong Kong Cantonese Receptive Vocabulary Test (HKCRVT) (Lee, Lee & Cheung, 1996). It was shown that comprehension scale of RDLS and expression scale of RDLS had high correlation (Au et al., 2004). As children with cleft palate were claimed to have impairment in vocabulary acquisition and production, HKCRVT was used to assess their receptive vocabulary. In the test, the child was shown four pictures including distractors and was required to select the one that matches a word spoken by the tester. Following the two language assessments, speech assessment using Section I of Cantonese Segment Phonology

Test (CSPT) (So, 1993) was administered that sounds in individual words were tested. This part contains 31 items at which all the Cantonese initial and final consonants, vowels and tones are included. Children with cleft palate would be categorized as having age-appropriate, delayed or disordered speech abilities according to their speech error patterns.

Parent Questionnaire

Parents of children with cleft palate aged 16 to 30 months were given the long Cantonese form of the Chinese Communicative Development Inventory: Words and Sentences (CCDI: Words and Sentences) (Tardif et al., in press). It is a normalized parent questionnaire that collects information on the child's knowledge of vocabulary and early grammatical ability. This form consists of two parts. The first part contains a list of words which is organized into 24 semantic or syntactic categories and it allows caregiver to check the child's vocabulary production. The parent is asked to indicate if the child "can say" in English and/or Cantonese of the vocabulary listed. The second part allows caregiver to check the child's sentence complexity and grammar. Section A and B of this part question the parent on how the child use words in different extent to refer to absent objects, people or events and on particular grammatical features that the child may use by rating the frequency of usage in the scale of 'not yet', 'sometimes' and 'often'. Section C focuses on how the child combines words into sentences. Parent is required to provide three of the longest utterances used by the child recently. Section D requires the parent to indicate the complexity of the

phrases and sentences the child used in different situations. The raw scores of the first part (vocabulary) and that of section D of the second part (sentence complexity) are converted to percentile ranks and norms are available based on the child's age. In this study, the CCDI: Words and Sentences form was completed by the child's primary caregiver who could reveal the child's language abilities based on his/her perception. It took approximately 30 minutes for the caregiver to complete the form. Instructions of how to fill in the questionnaire were given to the parents so as to ensure that he/she understand clearly. The completed questionnaire was then marked by hand scoring. Raw scores were converted to percentile rank scores and the results were compared with the norms to see if there would be any significant difference from the norms obtained from parents of normal developing children.

The combined use of standardized tests and parent questionnaire were used to assess the child's receptive ad expressive language ability. The raw scores obtained from RDLS, HKCRVT and CCDI: Words and Sentences would be used to compare with their corresponding norms. The results obtained could indicate both receptive and expressive language development of Cantonese-speaking children with cleft palate when compared with the non-cleft group to see if they were age-appropriate or having a delay.

Results

The results of this study will be presented according to the language measures used in three sections, i.e. language assessments, speech assessment and parent questionnaire.

RDLS and HKCRVT

Table 1 displays performance of all children in the two language measures in this study. According to McCauley (2001), the cutoffs used to identify children as having a below expectation performance are often subjectively set at 1.25 to 1.5 standard deviations below the mean. In this study, 1.25 standard deviations below the mean was chosen to be the cutoff score for diagnosing the child as having a language delay. There were two boys with cleft palate who performed more than 1.25 standard deviations below mean in both receptive and expressive part in RDLS and in HKCRVT, demonstrating delay in both receptive and expressive language ability. One boy with cleft palate was diagnosed to be having delay in both receptive and expressive part in RDLS but not in HKCRVT. Two girls with cleft palate showed delay in RDLS-Receptive part only while one boy with cleft palate showed delay in RDLS-Expressive part only. All of them had cleft lip and palate. Children with submucous cleft and those with cleft palate only did not show delay in all the language measures.

A correlation of 0.90 is found between RDLS-Receptive and RDLS-Expressive among the subjects participated in this study using Pearson product-moment correlation coefficient and it is statistically significant ($p < 0.05$). There was no previous report on correlation between the receptive part of RDLS and HKCRVT. The correlation of HKCRVT score and the RDL-Receptive score was investigated using Pearson product-moment correlation coefficient so as to verify the validity of using HKCRVT to assess receptive

language ability. A correlation of 0.95 is found and it is statistically significant ($p < 0.05$). This shows that HKCRVT is strongly correlated with RDLS-Receptive and it is a valid measure to assess children's receptive language ability.

Table 1. Performance of 20 children with cleft palate in RDLS (Cantonese) and HKCRVT.

	Subject	Age	Cleft Type	RDLS				HKCRVT	
				Receptive		Expressive			
				Raw	z-score	Raw	z-score	Raw	z-score
1	Hau CK	6;11	CP	63	0.53	65	0.23	63	0.50
2	Hung KS	6;09	SC	60	-0.40	63	0.00	62	0.00
3	Ting CY	6;08	Suspected SC	64	1.03	67	0.73	64	0.50
4	Wong OL	6;02	CLP	64	1.23	67	0.97	65	1.00
5	Hui XM	6;02	CP	62	0.73	68	1.17	64	0.50
6	So WS	5;11	CLP	62	0.83	64	0.53	59	-0.50
7	Tsang MH	5;07	CLP	49	-2.00	50	-1.66	49	-3.00
8	Pang TL	4;02	CLP	51	0.20	46	-1.00	46	-1.00
9	Cheung CC	4;01	CLP	54	0.80	59	1.00	61	1.50
10	Chan HY	4;01	CLP	47	-0.33	55	0.40	52	0.00
11	Yip H	4;00	CLP	51	0.30	61	1.30	50	-0.50
12	Ho TY	3;09	CP	58	2.00	55	0.90	49	-0.50
13	Leung CH	3;09	CLP	35	-1.80	39	-1.50	37	-2.50
14	Ma WY	2;11	CLP	26	-1.63	37	-0.47	29	-1.00
15	Ma LC	2;08	CP	46	2.50	36	0.00	43	1.50
16	#Chau LK	2;06	CLP	29	0.20	32	-0.10	24	-1.03
17	#*Chan CY	2;05	CLP	12	-1.70	29	0.13	-	-
18	#Lam LS	2;01	CLP	11	-1.93	13	-2.00	19	-0.50
19	#Wong SY	2;00	CLP	31	2.10	12	-1.90	41	2.00
20	#Ko CW	1;10	CLP	31	2.90	25	1.17	24	0.50

Note. CP= Cleft Palate Only, CLP= Cleft Lip and Palate, SC= Submucous Cleft Only,

= having delay, = at-risk

CCDI: Words and Sentences were given to the primary caregivers of the subjects.

*The subject fails to complete HKCRVT due to inattentiveness.

CSPT

Production of single word by all subjects in this study were transcribed and analyzed. Their speech abilities were compared with the norms provided by the CSPT. Articulation data of two subjects were used to check inter-rater reliability. Two raters were asked to work on the phonetic transcription of section I of CSPT. Point-to-point reliability was used to compare the transcriptions by the two raters. An inter-rater reliability of 92.97% was obtained.

A detailed analysis of the speech errors demonstrated by children with cleft palate was considered out of the scope of this study. However, based on preliminary analysis of the error patterns shown, only three out of twenty subjects were classified as having age-appropriate speech abilities, while the remaining seventeen subjects were classified as having a disorder according to So & Dodd (1994). Among them, cleft-related speech errors were noticed in nine subjects according to Stokes & Whitehill (1996). A summary of the error patterns is presented in Appendix.

CCDI: Words and Sentences

Only five out of the twenty subjects were between the ages of 16 to 30 months at which they were eligible for the use of CCDI: Words & Sentences. There were three boys and two girls at whom all of them were having cleft lip and palate. Only those vocabulary reported to be ‘can say’ in Cantonese by the child were counted in the vocabulary production section.

Table 2. Performance of five children with cleft palate in RDLS-Expressive and CCDI: Words and Sentences.

Subject	Age/Sex	**RDLS-Expressive**		**Vocabulary Production**		**Sentence Complexity**	
		Raw	z-score	Raw	% rank	Raw	% rank
Chau LK	2;06/M	32	-0.10	423	20	48	25
Chan CY	2;05/F	29	0.13	416	15	56	25
Lam LS	2;01/M	13	-2.00	161	30	13	55
Wong SY	2;00/M	12	-1.90	145	35	20	75
Ko CW	1;10/F	25	1.17	571	95	54	90

Note. = having delay

The raw scores and percentile ranks obtained from the sections of vocabulary production and sentence complexity in CCDI: Words and Sentences and their performance in RDLS-Expressive are presented in Table 2. The CCDI: Words and Sentences form has not yet published and thus has not been applied to clinical populations. As a result, no guidelines for interpretation of scores for language disordered children are established. Since 16th percentile would approximately equal to 1 standard deviation below mean, most language assessment tools used 15th percentile as the cutoff point. Adopted from the operational guideline of Scherer and D'Antonio (1995), the criterion for failure was modified and was set as performance at or below the 15th percentile in both of the normalized subsection, i.e. vocabulary production and sentence complexity. Only one girl performed at 15th percentile in the section of vocabulary production in CCDI: Words and Sentences. According to the criteria for failure above, her language ability was diagnosed to be within normal range, which was consistent with the results from her performance in RDLS-Expressive. However,

two boys diagnosed to have expressive language delays in RDLS-Expressive were found to be within normal range according to the scores in CCDI: Words and Sentences.

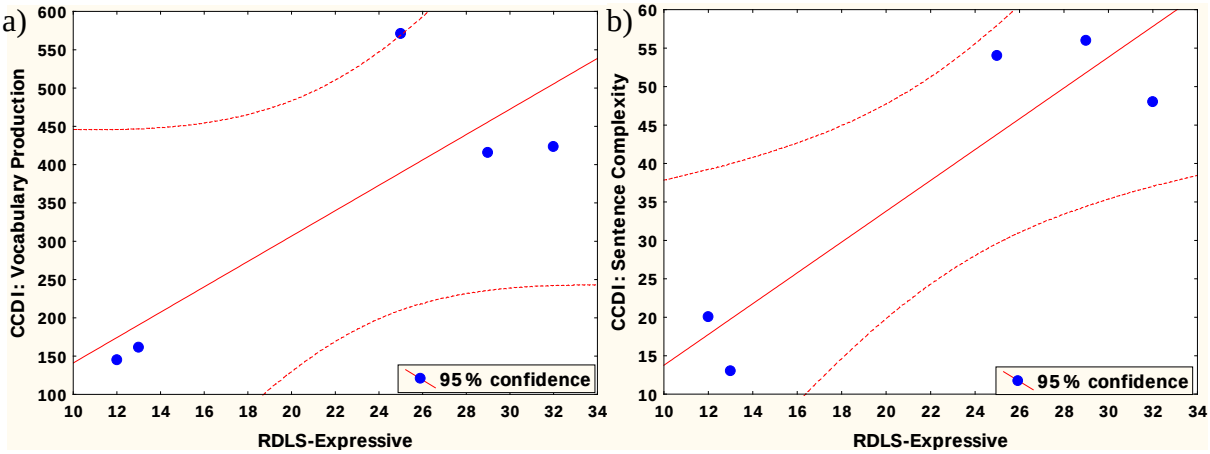

Figure 1. Relationship between RDLS-Expressive and CCDI: Words and Sentences on: a) Vocabulary Production (r =0.83, p>0.05), b) Sentence Complexity (r =0.91, p<0.05)

Although correlation between CCDI: Words and Sentences and RDLS-Expressive could not be determined due to limited number of data, it can be seen from Figure 1 that the relationships between RDLS-Expressive and CCDI: Words and Sentences approximate linear relationships, implying that the correlation between these two language measures may be good and more research is needed.

Discussion

This study aimed at answering the research question of whether Cantonese-speaking children with cleft palate have language problems and at exploring a protocol for assessing their language abilities in clinical practice. Based on the results from this study, six out of twenty children with cleft palate who aged 22 to 83 months, i.e. 30% of the sample size, were

diagnosed to have language delays in receptive and/or expressive language abilities using standardized tests, RDLS and HKCRVT. It showed consistency with previous studies that language abilities of English-speaking children with cleft palate were found to be delayed (Morris & Ozanne, 2003; Scherer, 1995; Scherer & D'Antonio, 1995; Witzel, 1995). Wong et al. (1992) reported a 3.4% of Chinese preschool children among normal population were found to have language delays. When compared with the results found in this study, the percentage of children having language delays was relatively high though the sample size was small. The high percentage of having language delays among the children with cleft palate in this study could be resulted from the recruitment procedure of subjects. Children with cleft palate recruited from the Hong Kong Association for Cleft Lip and Palate and private clinic were suspected to have speech and/or language problem by their parents at first. Therefore, the incidence of having language delays was relatively higher. However, with the factors of language performance affected by hearing impairment or syndromes like mental retardation excluded, it could not be denied that Cantonese-speaking children with cleft palate are at high risk of having receptive and/or expressive language delays.

Among the twenty children with cleft palate, two children aged between 16 to 30 months were diagnosed to have expressive language delays in RDLS. However, their language abilities were considered to be within normal ranges according to the parent reports. They performed at 30^{th} and 35^{th} percentile in vocabulary production and 55^{th} and 75^{th}

percentile in sentence complexity of CCDI: Words and Sentences respectively. Discrepancy between parent questionnaire and standardized measures was observed. Several reasons may account for this discrepancy. Firstly, the sample size of this study was small due to the limitation in recruiting children with cleft palate. Only five CCDI: Words and sentences forms could be completed and analyzed. This small sample size might affect drawing significant correlation between the parent questionnaire and standardized language measures. It might affect drawing conclusion of the validity of using CCDI: Words and Sentences in clinical populations. Secondly, dissatisfactions of using standardized tests were noted although they are excellent screening or diagnostic tools in assessing receptive and expressive language. It may be too simplistic to tackle the complex problems related to language disorders (Peterson-Falzone et al., 2000). Moreover, it is difficult to sample the child's optimal performance in standardized tests. In addition, inattentiveness was often resulted at the end of the evaluation after a long time of administration of all the language measures in this study. The short attention span might lead to poor performance in the standardized test which in turn leads to underestimation of the child's language abilities.

On the contrary, parent questionnaire could provide information on the child's optimal performance in everyday situation at home (Bates et al., 1988). The main concern would be on the accuracy and specificity of the information recalled (Dale, 1991). However, parent questionnaire was proved to have high validity in measuring vocabulary and syntactic

development not only in normal population (Dale, 1991), but also in cleft population (Broen et al., 1998; Scherer & D'Antonio, 1995). It was proven to be highly correlated with standardized test (Poon, 1999). Although a significant correlation could not be established between RDLS-Expressive and both vocabulary production and sentence complexity sections of CCDI: Words and Sentences due to the small number of subjects involved, it is believed that CCDI: Words and Sentences is a valid measure to assess the language abilities of Cantonese-speaking children with cleft palate.

Articulation of single words was also investigated in this study. It was observed that articulation problem was prone to most of the participants. All six Cantonese-speaking children with cleft palate who were diagnosed to have language delays were classified as having speech disorders with different error patterns shown. However, even children with normal range of language abilities in this study demonstrated different error patterns in articulation. Some of them even demonstrated cleft-related errors. Therefore, it is observed that speech problem does not necessarily correlate with language problems.

Clinical Implication

There has been no research done on language abilities of Cantonese-speaking children with cleft palate. This study acted as a pioneer in studying the language abilities of children with cleft palate in Cantonese-speaking populations. By the age of two, it was possible to identify children with clefts to be at risk clinically for language and speech impairment

(Morris and Ozanne, 2003). As this study revealed possible language delays in receptive and expressive language of children with cleft palate, not only the concerns of speech therapists are raised, but parental awareness in the language development of the children with cleft palate in addition to their speech problems should definitely be raised. Early language intervention could then be given as early as possible to the greatest benefit of the children.

For the speech and language assessment protocol for Cantonese-speaking children with cleft palate, combination of several standardized tests in the evaluation of children with cleft palate was not recommended since use of multiple tests would increase the chance of misdiagnosis rather increase the accuracy of the diagnosis (Gutierrez-Clellen, 1996). However, to evaluate the language abilities efficiently so as to identify language delay or at-risk group of children with clefts easily, a comprehensive assessment including two measures out of the three categories (standardized tests, criterion-referenced tests and parent questionnaire) is recommended. CCDI: Words and Sentences can be used to evaluate a child's language abilities. However, it is recommended that it is not used alone in the evaluation (Tardif et al., in press). It should be used together with either standardized test or criterion-referenced test, so as to give a detailed picture of the child's language abilities. A strong correlation was found between HKCRVT and RDLS-Receptive in this study. Therefore, the validity of using HKCRVT to assess the receptive language ability of a child was verified and could be used in the evaluation of receptive language ability of children with

cleft palate. Furthermore, a cutoff score of 1.25 standard deviations below mean was used to identify language delays in the children with cleft palate in this study. It is suggested that children with cleft palate who score at or more than 1.00 standard deviations below mean should be classified as at-risk group so that ongoing monitoring of language ability development could be provided. If this guideline is applied to this study, another two subjects could be identified as having risk of delay in language abilities in addition to the six subjects who diagnosed to have language delays, entailing that more attention should be given to their language development.

Directions for Further Research

This study acted as a pioneer in studying the language skills of Cantonese-speaking children with cleft palate, implicating a possible further research area in the Cantonese populations. However, this study could not provide a solid answer to the research question of whether Cantonese-speaking children with cleft palate have language problems due to limited sample size. It remains important to study further on factors like cleft types, ages, gender and time for palatal repair with a larger sample size. In this study, the language abilities of the children with cleft palate only and those with submucous cleft only were found to be within normal range. All the six children found to have language delays were of cleft lip and palate type. Due to the small sample size of this study, it is hard to draw conclusion if children with cleft palate only or children with submucous cleft only are not prone to language problems.

Therefore, the effect of cleft types acting on language abilities should be further investigated.

Owing to the limitation of small sample size, there were only a few children under each age group. The number of children in each age group was too small to draw conclusion on the effect of age on language abilities of Cantonese-speaking children with cleft palate. Besides, for children above six years old in this study, no language delay was observed. It is suspected that language problem in pre-school years will be diminished and the language abilities of the children will improve and catch up with their normal peer when they enter school. Longitudinal studies on the language development of children with cleft palate from as young as two to school age is recommended. In addition, reading abilities of the children were not addressed in this study, it would also be an appealing area for further investigation.

Besides, vocabulary reported to be ‘can say’ in English by the child were not counted in the vocabulary production section of CCDI: Words and Sentences in this study as the study aimed at focusing on Chinese language ability. As Hong Kong is a bilingual society nowadays, parents would teach and allow their children to expose to English more often. It was also observed that some children with cleft palate used English to name objects or picture cards in RDLS-Expressive part but those item(s) could not be given a score, resulting in low scores in this standardized test. The overall language abilities of the child would definitely be higher if those vocabulary spoken in English were also counted. Bilingual issues on language ability of children with cleft palate in Hong Kong were not addressed in this

study, but it is highly recommended for further investigation.

Conclusion

In this study, it was found that Cantonese-speaking children with cleft palate were at high risk in having receptive and/or expressive language delays. It indicated the necessity of language assessment in children with cleft palate in an early stage of language development so that early intervention can be provided to the children's greatest benefit. Besides, HKCRVT was proven to be valid for assessing receptive language ability of children in this study. Although correlations between CCDI: Words & Sentences and RDLS-Expressive could not be drawn due to small sample size, it is believed to be a valid and reliable measure for screening purpose. It is recommended to be used together with other standardized measure or criterion-reference test to evaluate children with cleft palate efficiently and effectively.

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Appendix

Summary of speech errors from Section I of Cantonese Segmental Phonology Test

	Subject	Age/Sex	Cleft Type	Errors noted (no. of occurrence)		Classification (observation)
				Vowels and diphthongs	**Consonants**	
1	Hau CK	6;11/F	CP	/	/	Age-appropriate
2	Hung KS	6;09/M	SC	/	k→ɸ (2), t→ɸ (2), t^h→h (2), k^h→h (1), s→h (4), f→h (1), ts→ɸ (2), t (1), ts^h→h (1), ŋ→l (1), j→ɸ (1) kw→ɸ (1), kw→w (1)	Disorder (with cleft-related errors)
3	Ting CY	6;08/M	Suspected SC	/	ts→ɸ (2), ts→j (1)	Disorder
4	Wong OL	6;02/F	CLP	/	/	Age-appropriate

5	Hui XM	6;02/F	CP	/	/	Age-appropriate
6	So WS	5;11/F	CLP	ɐi→ei(3)	/	Disorder
7	Tsang MH	5;07/M	CLP	/	t→h (1), k→h (1), t^h→h (2), k^h→h (1), f→h (2), s→t(1), ts^h (1), ts→s(1), t(1), l→j (1), kw→t(1), p(1) ,f (1), k^hw→kw (1),	Disorder
8	Pang TL	4;02/M	CLP	ɐ→ɔ(1), ɐi→ei(1).	t^h→k^h, ts→t (1), -n→ɸ (1)	Disorder (with cleft-related errors)
9	Cheung CC	4;01/M	CLP	/	t→h (1), k→h (1), t^h→h (1), k^h→t^h (1), f→l (1), s→h (4)	Disorder (with cleft-related errors)

					ts→h (3), ts^h→h (1) kw→w (2), k^hw→h (1), -t→-k (1)	
10	Chan HY	4;01/M	CLP	/	-ŋ→ɸ (1)	Disorder
11	Yip H	4;00/M	CLP	/	t→k (1), ts→t (1), ts^h→t^h (1), -ŋ→ɸ (1)	Disorder (with cleft-related errors)
12	Ho TY	3;09/F	CP		k→t (2), t^h→t (2), k^h→t (1), f→k (1), s→t (3), ts (1) ts→t (1), ts^h→ts (1), kw→p(1), k (1), k^hw→t (1)	Disorder
13	Leung CH	3;09/M	CLP	y→œ(1)	-n→ɸ (6), -ŋ→ɸ (3)	Disorder

14	Ma WY	2;11/F	CLP	ɐi→ei(1)	s->dentalized s (4), $ts^h \rightarrow t^h$(1), w→m (1)	Disorder
15	Ma LC	2;08/F	CP	ɐi→ei(2)	t→k (1), $t^h \rightarrow k^h$ (2), s→t (1) ts→k (2), ts^h→k (1)	Disorder (with cleft-related errors) (tone error noted)
16	Chau LK	2;06/M	CLP	ɵ→u(1), y→i(1), ɐi→ei(1)	t→k (1), ts→t (1), kw→p(1), k (1), $k^h w \rightarrow t^h$ (1), 1→m (1), -n→ɸ (4), -ŋ→ɸ (4)	Disorder (with cleft-related errors)
17	Chan CY	2;05/F	CLP	/	p→f (1), t→ɸ (1), k→t (1),	Disorder

					k^h→t (1),	
					s→t(1), ts (1)	
					ts→t (2), s (1), ts^h→t (1)	
					kw→ t(1), f (1), k^hw→kw (1),	
18	Lam LS	2;01/M	CLP	ɛ→ei(1),	p→ɸ(1), t→k(1),ɸ(1), k→ɸ(1)	Disorder
				ɵ→ei(1),	p^h→m(1), t^h→ɸ(1), k^h→k(1),	(with cleft-related errors)
				ɪ→ai(1),	f→hw(1), ts(1),	
				ɐ→ɐu(1), ɐi(1),	s->dentalized s(1), s→m (1),	
				iu→ei(1),	ts^h→ts (1)	
				ai→ɐi(1),	m→j (1), n→j (1), ŋ→ɸ (1)	
				ui→u(1).	kw→p(1), w (1)	
					j→m (1), ɸ →w (1)	

					-t→-k(1), ɸ (1), -k→ ɸ (1) -m→ɸ(1), -n→ɸ(3), -ŋ→ɸ(2)	
19	Wong SY	2;00/M	CLP	ɛ→ɪ(1), iu→i(1), ɐ→a(1).	p→ɸ(2), t→ɸ(2), k→ɸ(1), p^h→p(1), t^h→t(1), t^h→k(1), k^h→k(1), f→ɸ (2), s→ɸ (3), m→ɸ(2), n→ɸ(1), ts→ɸ (3), ts^h→ɸ (1), kw→ɸ (2), k^hw→ɸ (1) j→ɸ (1), w→ɸ (1), -p→ɸ(1), -t→-k(1), -k→ɸ(1), -m→-n(1), -n→ɸ (5), -ŋ→-n(1), ɸ (1)	Disorder (with cleft-related errors)
20	Ko CW	1;10/F	CLP	/	t→k (1), t^h→k (2),	Disorder

	s→t (1), s→ palatalized s (2) ts→palatalized ts(1), palatalized ts^h(2), ts^h→palatalized ts^h(1), -n→-ŋ (1), -ŋ→t (1)	(with cleft-related errors)

Note 1: CP= Cleft Palate Only, CLP= Cleft Lip and Palate, SC= Submucous Cleft Only, = Cleft-related errors (Stokes & Whitehill, 1996), Age-appropriate= The error patterns observed occur during typical phonological acquisition by that age (So & Dodd, 1994), Delay= The error patterns occur during normal development but are typical of younger children (So & Dodd, 1994), Disorder= The error patterns follow unusual rules (non-developmental error patterns). (So & Dodd, 1994).

Note 2: The following errors were considered to be acceptable errors (Bauers & Benedict, 1997) and were not listed in the above table:

1. n→1, in the item of nɐu(鈕)→lɐu
2. kw→k, in the item of kwɔ (果)→kɔ, but not in the items of kwa (瓜) and kwɐi (龜)
3. ŋ→ɸ, in the item of ŋan (眼)→an