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Safety of paediatric day-stay laryngeal surgery for recurrent respiratory papillomatosis

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ABSTRACT

Objectives: Safety assessment of day-stay laryngeal surgery in a cohort of children with recurrent respiratory papillomatosis (RRP). Recurrent respiratory papillomatosis is a chronic debilitating disease which usually requires multiple recurrent interventions under general anaesthesia. Day-stay surgery is an attractive option as it allows avoiding the inconvenience and costs of routine overnight admissions while recovering in the safe environment of the family home. This is the first study to assess the safety of day-stay laryngeal surgery in this cohort of patients.

Methods: Retrospective cohort study of all consecutive RRP procedures performed between December 1998 and May 2015 in a single paediatric tertiary-level hospital.

Results: A total of 465 surgical procedures were performed in 20 patients. Average age on diagnosis was 4.5 years. 415 (89.25%) of the procedures were done as day cases without overnight admission. Average number of procedures per patient was 20 and 25 for Children positive to HPV6 and HPV11, respectively. Only one patient after one single procedure (presenting 0.21% of total procedures, 0.24% of day-stay procedures) represented after discharge.

Conclusions: Day-stay surgery for children with RRP has a favourable safety profile in selected cases.

1. Introduction

Recurrent respiratory papillomatosis (RRP) is a devastating disease. The papillomatic lesions spread along the upper and lower airways, mainly at the level of the glottis and may cause hoarseness and breathing difficulty [1]. The disease is caused by human papillomavirus (HPV) and its presentation may vary between cases [2]. Main isolated HPV subtypes are 6 or 11 although others have been reported. Several studies have suggested that HPV 11 is associated with a more aggressive course than other subtypes [3,4]. Patients usually undergo multiple surgeries to maintain a patent airway and in order to improve their voice quality. Surgery is performed under general anaesthesia mostly when the patient is spontaneously ventilating and the length of surgery is related to disease burden, equipment used and the surgeon's experience. Laryngeal suspension is necessary for proper exposure and the lesions are removed using either cold instruments, lasers (CO_2 or KTP), coblation or a laryngeal microdebrider. Patients undergo numerous procedures as this disease is chronic and relapsing in nature [6,7,8].

In many Otolaryngology units these patients are admitted for overnight observation following surgery although most of the patients in our tertiary-level paediatric hospital will be discharged on the same day of the procedure. Day-stay surgery for these patients is an attractive option and although practiced in our unit and elsewhere, its safety was never assessed.

2. Material and methods

Retrospective chart review of all consecutive RRP procedures performed between December 1998 to May 2015 in a single paediatric tertiary-level institution in Auckland, New Zealand. Clinical files and operative records on 465 consecutive procedures in 20 patients were found and examined. Once a patient reached the age of 18 years he/she were transferred for care by an adult laryngologist and all procedures from that point in time were not included in our analysis.

Inclusion criteria: all patients below 18 years of age who were diagnosed with RRP during the study period of December 1998 to May 2015 in Starship Children's hospital. Exclusion criteria: patients with a tracheostomy, age above 18 years.

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Our treatment protocol for newly diagnosed RRP patients is to perform the first diagnostic and therapeutic procedure as an inpatient with overnight admission to observe for post-surgical or anaesthetic complications and to rule out early airway or swallow problems.

All patients are assessed prior to the first surgery by a paediatric otolaryngologist for airway, swallow and voice dysfunction. Flexible nasendoscopy is always performed prior to surgery for diagnosis and surgical planning. During the first procedure a biopsy is routinely sent as well as a polymerase chain reaction (PCR) sample for HPV subtyping.

Routine surgical technique includes suspension microlaryngoscopy under spontaneous ventilation with transnasal oropharyngeal-placed ETT (endotracheal tube). All patients were given routine intra-operative systemic Dexamethasone (one dose of 0.1–0.15 mg/kg). No Dexamethasone was routinely given post-operatively. Surgical tools include laryngeal microdebrider (skimmer blade, 2.9 mm), CO_2 laser, KTP laser, cold steel instruments, coblation.

Intra-lesional Cidofivir injections may sometimes be used according to the subjective impression of the consultant surgeon. When the disease behaviour appears to be more aggressive than usual an intra-lesional injection is considered as an adjunctive measure after papilloma ablation. Disease aggressiveness is assessed according to tumour bulk and tumour re-growth rate.

In day-case procedures the patients are transferred from theatre to the post-anaesthetic recovery unit (PACU) and observed there for about 1 h. After that time they are transferred to a nearby day-stay facility where they are followed up for additional 3 h before discharge. All patients are reviewed by a nurse and the surgeon prior to discharge. Primary carers are advised to represent to our hospital's CED (children's emergency department) in case of any problems. Our children's hospital is the only paediatric tertiary referral centre in the country so we expect to receive all representations.

Further procedures are planned according to surgical findings and clinical history while voice and airway issues are the two main domains which guide decisions.

Records of representations/readmissions were reviewed by searching our hospital electronic database.

Institutional review board approval was obtained for this study (Auckland District Health Board Research Review Committee). Study reference details A+6880.

3. Results

A total of 465 surgical procedures were performed during the study period with an average of 23 procedures for each patient. 20 patients included with an average age on diagnosis of 4.5 years. Table 1 summarizes demographic details. Ethnic origin was mostly either Maori/Pacific islanders (10 patients, 50%) or European (8 patients, 40%). Surgical tools included laryngeal Microdebrider (274 procedures, 58.9%), CO_2 laser (92 procedures, 19.8%), cold steel (17 procedures, 3.65%), KTP laser (7 procedures, 1.5%) and coblation (2 procedures, 0.43%). The remaining of the cases was done using a combination of these surgical tools. Each procedurist (consultant surgeon) decided on the use of a specific surgical tool according to his/her preference for every case.

Samples for HPV subtyping were sent routinely for polymerase chain reaction (PCR) during the first procedure for every patient. HPV6 and HPV11 were positive in 11 and 9 patients, respectively. One patient was positive for both HPV6 and HPV11 and one patient was HPV-negative following multiple assays. Table 2 compares the characteristics of patients with HPV6/11.

One patient from this cohort (patient number 6, Table 1) received anti-HPV vaccination (Gardasil).

57 procedures were performed with adjunctive intra-lesional Cidofivir injections in 7 different patients. One Cidofivir injection was complicated by the need for post-injection intubation. The rest of the injections were uneventful.

Patients were admitted for overnight observation in 50 out of 465 procedures (10.75%). Every patient was routinely admitted after the first procedure (20 admissions) while the remaining was due to various reasons (30 admissions, Table 3). Most of the overnight admissions were due to bulky disease or after patients presented to the ED with respiratory complaints (which was secondary to bulky disease). Five patients were admitted overnight due to different problems in the immediate recovery period (all during the first 3 h after surgery): asthma flare-up, nausea and

Table 1
Patients demographics, HPV subtyping, Cidofivir use and choice of surgical technique.

#	Ethnicity	Date Dx	Age Dx	HPV typing	Total proc.	CO_2	Microdebrider	KTP	Coblation	Cold steel	Cidofovir	Discharged
1	European	11/2004	8y3m	11	8	1	7	Nil	Nil	Nil	Nil	12/2010
2	European	Dec-98	3y10m	6	35 (+9 adult)	25	10				4	Referred to adult service
3	Maori	02/2002	4y6m	11	45	17	25				11	Referred to adult service
4	Maori	03/2001	2y5m	6	65	15	46	1	1	1	13	Referred to adult service
5	Maori	06/2007	2y4m	6	16	1	11					05/2011
6	Maori	04/2009	1y	11	37		37	2			5	No
7	Maori	03/2010	10y	6	7		2			2		06/2013
8	Maori	03/2012	4y3m	11	14		8	3		1		02/2014
9	European	05/2011	22m	6	36		29	3		1	6	No
10	European	10/2007	1y7m	11	74	20	49			1	15	No
11	Samoan	06/2010	3y1m	6	20	2	17				3	No
12	European	04/2005	1y11m	11	15	6	3			1		02/2010
13	Maori	12/2007	1y	3 × neg. tests	9	5	1			1		12/2010
14	Indian	09/2012	4y11m	6	13		13					No
15	European	05/2013	2y11m	11	9		2			6		No
16	European	05/2014	8y5m	11	10		10					No
17	European	Aug-13	3y7m	6	9		4	1		3		No
18	Chinese	03/2012	6y10m	6 and 11	11	Nil	10	Nil	1	Nil	Nil	No
19	Cook Island	04/2015	6y0m	6	3							No
20	Cook Island	05/2015	13y2m	6	2							No