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PAEDIATRIC TRACHEOSTOMIES IN JOHANNESBURG:

A TEN YEAR REVIEW.

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ABSTRACT

Introduction

A tracheostomy in the paediatric age group is a created clinical situation that demands highly specialized care.

Whilst the procedure itself may be performed as a lifesaving measure, the high level of care required to maintain this artificial airway is unfortunately associated with a higher morbidity and mortality than in the adult tracheostomy patient.

The successful management of these young patients with the burden of a tracheostomy airway requires the overcoming of many challenges, particularly those of a resource poor environment.

No standard protocol of care for these patients exists, with care practices and care related complications varying widely between institutions and regions.

Shifts in age and indication demographics have been noted internationally, with infants now comprising the largest age group, and prolonged intubation for ventilation the most common indication.

Aims

The aims of this study were to describe:

- The demographics viz. the age, indications, and outcomes for these patients - in the Johannesburg Public Hospital Sector, thus providing a basis for understanding the patient profile, and
- The particular clinical problems encountered in this local and regional setting.

Materials and Methods

- A retrospective study was conducted, selecting and evaluating data over a 10 year period from 1st January 2001 to 31st December 2010.
- All Patients in the age group less than 18 years of age were identified.
- These patients had undergone the procedure of tracheostomy in any of the four Johannesburg Academic Hospitals viz. Chris Hani Baragwanath Hospital, Charlotte Maxeke Johannesburg Academic Hospital, Helen Joseph Hospital, and Rahima Moosa Mother and Child Hospital.
- These patients were evaluated for age and for indication profiles, and for complications associated with the technical procedure and /or of the care of this artificial airway. Various factors were identified in ascertaining the effect on the final outcome.

Results of Case Identification:

- Complete clinical records were found for 70 patients. The ages ranged from 2 weeks (neonate) to 17 years, with a mean age of 7 years.
- Only 18.5 % of patients were infants (under 1 year of age), with the neonatal age group accounting for just 4% (n= 3) of cases.
- The largest proportion was the 5.1- 10 year age group (30% of cases).

INDICATIONS:

1. The most common indication group for tracheostomy were those with a potentially life threatening upper airway obstruction. These accounted for 67% (n = 47) of the cases.
2. Only 12% (n = 9) of cases were performed for prolonged intubation for positive pressure mechanical ventilation associated with respiratory disease.
3. Central nervous system disease associated with a depressed level of consciousness accounted for 14% (n = 10) of cases.
4. Five percent (n = 4) were indicated for surgical prophylaxis associated with potential upper airway compromise.

Specific indications within these groups showed that the highest numbers of tracheostomies were performed for subglottic stenosis of the laryngeal airway, accounting for 28% of cases, and severe head trauma (i.e. requiring airway protection for depressed level of conciousness), accounting for 12% of cases. Glottic stenosis consequent on repeated surgeries for excision or ablation of recurrent laryngeal papillomata accounted for 7% of cases.

MORBIDITIES:

A total of 65 morbidities were encountered in 41 patients.

- The most commonly encountered complication was tracheostomy tube / cannula obstruction with blood clots and/or thickened, desiccated pulmonary secretions - with 23 episodes accounting for 35% of complications.
- Nosocomial Pneumonia was the second most common complication, accounting for 33% of cases (n=22).
- Other complications included:
  - Operative site bleeding,
  - Accidental early decannulation,
  - Local wound infection,
  - Neck and chest wall surgical emphysema,
  - Exuberant granulation tissue formation, and
  - Cannula breakage with aspiration.

Complication rates in the neonatal and infant subgroups were significantly higher than in other age groups ($p = 0.0296$), with an average complication rate of 1.53 events per patient.

MORTALITY:

- An overall mortality rate of patients with tracheostomies was found to be 27%.
- The mortality rate associated directly with tracheostomy care accounted for 8.5%. Of these cases, 86% were due to cannula airways obstruction ($n = 5$).
- The mean age of the patients that died from acute cannula obstruction was 2.45 years (i.e. the toddlers).

IN-HOSPITAL STAY:

- The duration of in-hospital stay from day of procedure to release from in-hospital based care revealed a mean of 147 days (Range 5 – 1360 days).
- The largest percentage of patients (44%, n = 31) were admitted for a period of less than 1 month, however, prolonged admissions were noted, with 11% of patients (n = 8) admitted for a period of more than 1 year.
- A significant correlation of in-hospital stay was established with age - being inversely proportional to length of stay (r = -0.29); with the infant group having the longest mean duration of in-hospital stay (259 days).
- The overall discharge rate was 60%. Of the discharged patients, 57% were successfully discharged with tracheostomies in place for continued care in the home environment.

CONCLUSIONS

1. This study showed that the Johannesburg academic hospitals have not followed the international shift in age and indication demographics; infants do not constitute the majority of patients in our institutions, and upper airway obstruction, rather than prolonged intubation for ventilation, remains the most common indication for tracheostomy. Of the upper airway obstruction group, subglottic stenosis and laryngeal papillomatosis were the most common causes.
2. This study also showed that mortalities and morbidities occurred at a higher rate than reported in the literature, with an average 2.35 complications per tracheostomy year, compared to 0.12 complications per tracheostomy year of similar studies.[23]

   Cannula obstruction and nosocomial pneumonia were identified as the major complications affecting 32% and 31% of patients respectively, compared to 5- 14% and 1.7- 19.5% respectively reported in other institutions.[1,3,23,25,28] The tracheostomy related mortality rate of 8.5% was far higher than the average 1.47% reported in other institutions.[10]
3. Prolonged admissions were observed as a result of difficulties in instituting home based care.
4. Factors associated with improved outcomes included; age over 1 year, tracheostomy tubes with internal diameters of more than 4.5mm, the presence of inner cannulas in the tubes, shorter duration of admission, and the adjunct to surgery indication group.

CLINICALLY DERIVED RECOMMENDATIONS FROM STUDY:

Interventions aimed at addressing the identified areas may therefore be instituted.

These may include:

- Weekly fibre-optic endoscopy for prolonged intubation ventilated patients, to view time of progressive pressure injury to mucosa; and a lower threshold for tracheostomy in the older child.

- Refining the surgical technique of trainees, i.e. minimizing dissection of trachea and safe cannulation procedures. This includes minimizing mucosal injuries during the debulking procedures of laryngeal papillomata.

- Improving the training programmes of paediatric nursing staff involved in airway care.

- Establishing tracheostomy care units within the paediatric ward facilities.

- Establishing a formal tracheostomy home care program, through social workers, home nursing programmes, in collaboration with local or regional health provider facilities.

- Allocation of a specific budget for the provision of home tracheostomy care e.g. suction equipment - using of mechanically operated pumps; and the usual resuscitation equipment on standby.

- A greater availability of the more resilient, lighter weight and the longer lifespan Stainless Steel paediatric tracheostomy tubes with inner cannulas.

With these practical and pragmatic interventions it seems quite possible and feasible to improve the outcomes of children that require long term tracheostomy in the care of our institutions. These are generally children with good long term prognoses and thus potentially normal individuals in the long term.