WEST AFRICAN JOURNAL OF MEDICINE

ORIGINAL ARTICLE

Nasogastric Tube Use in Children after Abdominal Surgery – How long should it be Kept *in Situ?*

Utilisation De La Sonde Nasogastrique Chez Des Enfants Après Une Chirurgie Abdominale – Combien De Temps Doit-Elle Être Gardée?

F. A. Abantanga

ABSTRACT

BACKGROUND: **Traditionally, the use of a nasogastric tube (NGT) after a laparotomy is said to prevent vomiting, aspiration, abdominal distension and paralytic ileus, which are likely to complicate the postoperative course.**

OBJECTIVE: **To determine if discontinuation of NGT within 24 hours of abdominal surgical procedures in children has any effect on postoperative recovery.**

MATERIALS AND METHODS: **We prospectively studied children who needed NGT passed for abdominal surgical procedures. NGTs were removed within 24 hours in all but 46 children who had the tube in situ for 3 to 5 days. Time to first and full oral feeds, length of hospital stay and complications were compared between the groups.**

RESULTS: **Children who had their NGTs removed within 24 hours (N = 120, Group 1) were compared with those who had NGT in place for 3 to 5 days (N = 46, Group 2). The mean time to first oral sips was 1.02 ± 0.13 days for Group 1 and 3.09 ± 0.29 days for Group 2 (p = 0.001). The mean time to full feeding was 2.22 ± 0.54 days for Group 1 and 4.54 ± 0.55 days for Group 2 (p = 0.001). Mean length of hospital stay (LOHS) was 8.32 ± 5.49 days for Group 1 and 12.78 ± 8.79 days for Group 2 (p = 0.001). Mean LOHS was 9.55 ± 6.85 days for both groups combined. Ten complications associated with the removal of the NGT occurred in both groups– 6 in Group 1 and 4 in Group 2 (p = 0.37). These were mainly vomiting and abdominal distension.**

CONCLUSION: **Our findings suggest that routine use of NGTs for decompression after laparotomy may be safely dispensed with after the child has recovered from anaesthesia. WAJM 2012; 31(1): 19–23.**

Keywords: **Nasogastric tube, paediatric, laparotomy, abdomen, protocol, surgical procedure**

RÉSUMÉ

CONTEXTE: Traditionnellement, l'utilisation d'une sonde nasogastrique (SNG) après une laparotomie a pour but de prévenir les vomissements, l'aspiration, la distension abdominale et l'iléus paralytique qui peuvent compliquer les suites opératoires.

OBJECTIFS: Déterminer si le retrait de la SNG dans les 24h suivant la chirurgie abdominale chez les enfants a un effet sur la récupération en post opératoire.

MATÉRIELS ET MÉTHODES: Nous avons étudié de façon prospective des enfants qui ont besoin d'une SNG pour une chirurgie abdominale. Les SNG ont été retirées dans les 24h suivant la chirurgie chez tous les enfants à l'exception de 46 d'entre eux qui l'ont porté pendant 3 à 5 jours. Le délai de la première alimentation per os et de l'alimentation per os complète, la durée de l'hospitalisation et les complications ont été comparés dans les 2 groupes.

RÉSULTATS: Les enfants chez qui la SNG a été retirée dans les 24 heures (N = 120, Groupe 1) ont été comparés à ceux qui avaient gardé la SNG pendant 3-5jours (N = 46, Groupe 2). Le délai moyen de la première alimentation per os était de 1.02 ± 0.13 jours pour le Groupe 1 et de 3.09 ± 0.29 jours pour le Groupe 2 (p = 0.001). Le délai de l'alimentation orale complète était de 2.22 ± 0.54 jour pour le Groupe 1 et de 4.54 ± 0.55 jours pour le Groupe 2 (p = 0.001). La durée moyenne d'hospitalisation était de 8.32 ± 5.49 jours pour le Groupe 1 et de 12.78 ± 8.79 jours pour le Groupe 2 (p = 0.001). La durée moyenne d'hospitalisation était de 9.55 ± 6.85 jours pour les 2 Groupes combinés. Dix complications associées à l'ablation de la SNG ont été retrouvées dont 6 dans le Groupe 1 et 4 dans le Groupe 2 (p = 0.37). Il s'agit essentiellement de vomissements et de distension abdominale.

CONCLUSION: Nos résultats suggèrent qu'on peut sans risque, se passer de la SNG pour une décompression après une laparotomie lorsque l'enfant a récupéré de l'anesthésie. **WAJM 2012; 31 (1): 19–23.**

Mots Clés: Sonde Naso gastrique, pédiatrie, laparotomie, abdomen, protocole, opération chirurgicale

Department of Surgery, School of Medical Sciences/Komfo Anokye Teaching Hospital, College of Health Sciences, Kwame Nkrumah University of Sciences & Technology, Kumasi, Ghana

Correspondence: **Prof. F. A. Abantanga,** Department of Surgery, Komfo Anokye Teaching Hospital, P. O. Box 1934, Kumasi, Ghana. Email: frankabantanga@hotmail.com Telephone: +233-26-8168700; fax: +233-3220-22307.

Abbreviations: **AJOL,** African Journals Online; **CI,** Confidence interval; **LOHS,** Length of hospital stay; **NGT,** Nasogastric tube.

INTRODUCTION

Nasogastric tubes (NGTs) are used routinely in children before abdominal surgery is carried out and are usually kept in place after laparotomy until normal bowel function returned. The purpose of the NGT is to hasten the return of bowel function thus decreasing postoperative ileus, prevent postoperative complications, diminish the risk of anastomotic leak, increase patient comfort and shorten hospital stay.[1–8] But it is known that routine gastric decompression after major surgery neither hastens the return of bowel function nor diminishes the incidence of post-operative nausea and vomiting[9–11] and omitting to pass a nasogastric tube does not increase the incidence of anastomotic leakage or wound dehiscence.[1,9] In fact, the routine use of NGTs in the general surgery population in most parts of the world has been determined to be unnecessary in subsets of patients[6,10,12,13] and may even be associated with additional risk of aspiration, significant postoperative discomfort and fever.[8,14]

The few articles about NGT decompression conclude that there was no need for routine postoperative decompression in the paediatric age group after laparotomy.[1–3] A web search (African Journals Online [AJOL], PubMed, Ovid, Cochrane Reviews and Bioline International) in the literature of the sub-Saharan region for similar studies to date did not yield any publications/ studies to the effect that NG tubes should not be routinely used in children after both elective and emergency surgeries as is done in most centres of the world. Thus, the rationale behind this study was to establish whether NGTs could be routinely omitted in children requiring a laparotomy for both elective and emergency surgical abdominal conditions in a developing country without any adverse effect since studies have concluded that such tubes are uncomfortable, can cause considerable pain and may lead to a fever.[3,8,14]

SUBJECT, MATERIALS AND METHODS

A prospective study of all children undergoing abdominal surgical procedure for various disease processes for 14 months, from August 2006 to September 2007, was carried out. The children were divided into two groups and the data obtained was analyzed with respect to patient demographics, operative procedure performed, time to first oral sips, time to first full oral feeds, length of hospital stay (LOHS) and postoperative complications were compared. Due to protocol violations, the study which started as a randomised one ended up having more children in the study group than the control group. The reason was simply that more children had their NGTs removed within 24 hours after the laparotomies than was necessary. All children aged more than one month and less than 15 years were included in the study.

The data was analyzed using SPSS 16.0. Chi-square analysis and the Fisher exact test were used for categorical data and continuous variables were reported as a mean ± standard deviation (SD). Where applicable, confidence intervals were also calculated. A p-value ≤ 0.05 was considered statistically significant.

RESULTS

There were, in all, 166 children who underwent abdominal surgical procedures: 100 boys and 66 girls, with a mean age of 6.33 ± 4.08 years (95% Confidence Interval (CI) = 6.33 – 6.96; median – 6.50 years). The number of children who had their NGTs removed within 24 hours after the abdominal procedure were 120 (Group 1) and those whose tubes were left in situ for 3 to 5 days were 46 (Group 2). The mean age of the Group 1 children was 5.85 ± 4.12 (95% CI = 5.11 – 6.60) and for those in Group 2, it was 7.59 ± 3.74 years (95% CI = 6.48 – 8.70) (p = 0.01). Table 1 lists the abdominal procedures performed for the various elective and emergency conditions that were diagnosed in these children.

Table 2 depicts the summary data of the primary measures of the post-operative course for both groups. This shows that there was a significant decrease in the mean time to first oral sips, time to full oral feeds and LOHS in Group 1 (those with the NGT removed within 24 hours after an abdominal surgical procedure) as compared to those in Group 2 (p = 0.001).

The NGT was re-passed because of vomiting in 4 children in Group 1 and in one child in Group 2 and also as a result of abdominal distension in 2 children in Group 1 and 3 in Group 2 i.e. 6 children (5.00%) had the NGT re-inserted in Group 1 and 4 (8.70%) in Group 2 (p = 0.13). In all cases of re-insertion of the tubes, they were either immediately removed when abdominal distension subsided after placement or left in situ for a maximum of 48 hours. The differences between the two groups in terms of secondary end point measures were not significant as demonstrated in Table 3. There were in all a total of 16 other complications (13.33%) in Group 1 and 12 (26.09%) in Group 2 (p = 0.19).

Mortality rate for both groups was 5.63%; mortality in Group 1 was 5.00% and in Group 2 – 6.52% (p = 0.709). The deaths were all as a result of continuing peritonitis and/or sepsis/septicaemia, mostly after operations for typhoid ileal perforation;[6] other deaths were as a result of intussusception[2] and mesenteric cyst.[1]

DISCUSSION

There are no evidence-based studies available in the world literature today which support the use of NGT in children after abdominal surgical procedures because it is advantageous to do so over its non-use in the peri-operative period. Routine decompression of the stomach using an NGT during the postoperative period after abdominal surgeries in children is said to accelerate the return of bowel function, prevent vomiting, diminish the risk of anastomotic leakage and postoperative surgical wound complications (such as surgical site infection, wound dehiscence) and shorten length of hospital stay.[1–3,13,15] Despite the lack of evidence that it can eliminate all or most of the above listed goals and in spite of the lack of properly designed studies to support the theoretical advantages[16] NGT decompression is continuously employed routinely for all elective and emergency abdominal procedures in children in Ghana and most parts of the world[5,17] The very few studies available advocate against the routine use of NGTs in children but rather support its selective use.[1–3,15] Even though in adult surgery randomised

clinical trials,[14,16,18–20] clinical reviews[9,10,21] and meta-analysis[5,12] have conclusively advocated against the routine use of NGT after abdominal surgical procedures, surgeons in Ghana and most parts of the world persist in its use for decompression. In these review articles and meta-analysis in adults, researchers have convincingly demonstrated that patients managed without an NGT had fewer complications, earlier return of bowel movement, shorter hospital stay[2,3,10,12] with no increase in complication rates and that the incidence of anastomotic leak was no different between patients with or without NGT decompression after abdominal procedures.[10,21] As a result many adult general surgeons have shifted from using NGT decompression routinely to its selective use or non-use after abdominal procedures.

In the sub-Saharan region, we have not come across any studies advocating against the use of NGTs in children, except for one study in adult surgery by Ocen W. *et al*[17] from Kampala, Uganda, which advocates selective nasogastric suction following abdominal surgery, which method the authors believe is safe and associated with postoperative reduction of morbidity, a quicker recovery and a shorter hospital stay than the use of routine nasogastric decompression. The present study and others[1–3,10,15,21] tend to agree with this assertion and also stress that there is no increase in the postoperative complications; these same studies, including ours, have demonstrated that the incidence of anastomotic leak is no different between those with NGT decompression and those without it (Table 3).

Children are said to swallow a large amount of air when crying and so the use of NG decompression is believed to play an important role in preventing abdominal distension with its attendant complications.[3] This assertion has not been supported by the present study which did not use NGT decompression in one hundred and twenty children and as a result did not notice any adverse findings as compared to those who had the tube in place for three days or more. If anything, many children cried because

Table 1: Type of Operation Performed (n = 166)

Procedure	Number of days NGT was retained		
	Group 1	Group 2	Total
Closure of gastrointestinal perforations	39	23	62
Appendicectomy	18	10	28
Resection of bowel with end-to-end anastomosis	18	1	19
Manual reduction of intussusception	11	2	13
Closure of colostomy	9	1	10
Laparotomy with evacuation of intraabdominal pus	3	0	3
Hernia repair (strangulated inguinal & incisional)	3	0	3
Posterior sagittal anorectoplasty	3	0	3
Nephrectomy	2	1	3
Laparotomy for abdominal trauma	1	2	3
Creation of colostomy	2	0	2
Salpingoophorectomy for torsion of ovarian cyst	2	0	2
Soave endorectal pull-through procedure	2	0	2
Laparotomy for acute mesenteric lymphadenitis	0	2	2
Adhesiolysis for postoperative intestinal obstruction	1	1	2
Cholecystectomy	1	1	2
Choledochojejunostomy	0	1	1
Splenectomy	1	0	1
Pyloromyotomy	1	0	1
Ladd's procedure	1	0	1
Miscellaneous	2	1	3
Total	**120**	**46**	**166**

Table 2: Postoperative Course

	Group 1	Group 2	p-value
Time to first oral sips (days)	1.02 ± 0.13	3.09 ± 0.29	0.001
Time to full oral feeds (days)	2.22 ± 0.54	4.54 ± 0.55	0.001
Length of hospital stay (days)	8.32 ± 5.49	12.78 ± 8.79	0.001
Need for re-insertion of NGT	6 (5.00%)	4 (8.70%)	0.13

Table 3: Secondary End Point Measures used in Comparing the two Groups

Complication	Group 1 (n = 120) {%}	Group 2 (n = 46) {%}	Total Complications
Burst abdomen	1 {0.83}	1 {2.17}	2
Superficial surgical site infection	8 {6.67}	2 {4.35}	10
Deep surgical site infection	3 {3.33}	4 {8.70}	8
Enterocutaneous fistula	2	0	2
Reperforation of ileum (after closure of typhoid ileal perforation)	0	1	1
Bleeding from surgical wound	1	0	1
Recurrence of intussusception	0	2	2
Anastomotic leak	0	1	1
Bile leak	0	1	1
Total	**16 {13.33}**	**12 {26.09}**	**28**

the tube was left in place and wanted it taken out.

Our study has demonstrated that oral sips can be started immediately after removing the NGT (within 24 hours), even in children who had undergone resection of bowel and anastomosis (refer to Table 1) and that children with the NGT taken out within 24 hours after abdominal procedures start full oral feeds earlier and are discharged home earlier than children who are managed routinely with the NGT in situ for several days. (Compare: LOHS was 8.32 ± 5.49 days for Group 1 and 12.78 ± 8.79, p = 0.001). Another advantage, as a result, is that costs to both the hospital and the patient are reduced since patients are discharged home earlier than usual. Many studies have shown that immediate or early postoperative feeding is feasible, well tolerated and safe after laparotomy, including gastrointestinal tract surgery and is associated with reduced post-operative discomfort and a more rapid recovery in patients, significantly faster resolution of postoperative ileus and a shorter length of hospital stay.[7,8,22–28]

We think we have demonstrated with this study that there is no additional benefit in routinely passing an NGT for every child undergoing a laparotomy but that it should be used selectively and only when absolutely necessary. Our study has also proven that NGT can safely be excluded in patients undergoing emergency (non-elective) bowel anastomosis, since most of our anastomoses were of that nature contrary to the implied admonition by Davila-Perez R *et al*[1] not to remove the NGT in emergency situations.

In conclusion, routine decompression of the gastrointestinal tract using an NGT does not wholly accomplish any of its intended goals such as prevention of vomiting, abdominal distension, wound dehiscence, anastomotic leak and shortening of the length of hospital stay and should therefore be abandoned in favour of selective use of the NGT to relieve gastric symptoms when they arise or when there is a strong index of suspicion such symptoms or complications will occur in the postoperative period.

REFERENCES

1. Davila-Perez R, Brancho-Branche E, Tovilla-Mercado J, Hernandez-Plata J, Reyes-Lopez A, Nieto-Zermeño J. Unnecessary gastric decompression in distal elective bowel anastomosis in children: a randomized study. *World J Surg* 2010; **34:** 947–953.
2. Dinsmore JE, Maxson RT, Johnson DD, Jackson RJ, Wagner CW, Smith SD. Is nasogastric tube decompression necessary after major abdominal surgery in chidren? *J Pediatr Surg* 1997; **32:** 982–985.
3. Sandler AD, Evans D, Ein SH. To tube or not to tube: do infants and children need post-laparotomy gastric decompression? *Pediatr Surg Int* 1998; **13:** 411–413.
4. Sagar PM, Kruegener G, MacFie J. Nasogastric intubation and elective abdominal surgery. *Br J Surg* 1992; **79:** 1127–1131.
5. Vermeulen H, Storm-Versloot MN, Busch ORC, Ubbink DT. Nasogastric intubation after abdominal surgery. *Arch Surg* 2006; **141:** 307–314.
6. Daryaei P, Davari FV, Harirchi MM-I, Salmasian H. Omission of nasogastric tube application in postoperative care of esophagectomy. *World J Surg* 2009; **33:** 773–777.
7. Cutillo G, Maneschi F, Franchi M, Giannice R, Scambia G, Benedetti-Panici P. Early feeding compared with nasogastric decompression after major oncologic gynecologic surgery: a randomized study. *Obstet Gynecol* 1999; **93:** 41–45.
8. Zhou T, Wu X-T, Zhou Y-J, Huang X, Fan W, Li Y. Early removing gastrointestinal decompression and early oral feeding improve patients' rehabilitation after colorectostomy. *World J Gastroenterol* 2006; **12:** 2459–2463.
9. Tanguy M, Seguin P, Malledant Y. Bench-to-bedside review: routine postoperative use of the nasogastric tube - utility or futility? Critical Care 2007, 11:201. Available online at http://ccforum.com/content/11/1/201.
10. Nelson R, Tse B, Edwards S. Systematic review of prophylactic nasogastric decompression after abdominal operations. *Br J Surg* 2005; **92:** 673–680.
11. Manning BJ, Winter DC, McGreal G, Kirwan WO, Redmond HP. Nasogastric intubation causes gastroesophageal reflux in patients undergoing elective laparotomy. *Surgery* 2001; **130:** 788–791.
12. Cheatham ML, Chapman WC, Key SP, Sawyers JL. A meta-analysis of selective versus routine nasogastric decompression after elective laparotomy. *Ann Surg* 1995; **221:** 469–478.
13. Pessaux P, Regimbeau J-M, Dondéro F, Plasse M, Mantz J, Belghiti J. Randomised clinical trial evaluating the need for routine nasogastric decompression after elective hepatic resection. *Br J Surg* 2007; **94:** 297–303.
14. Gouëffic Y, Rozec B, Sonnard A, Patra P, Blanloeil Y. Evidence for early nasogastric tube removal after infrarenal aortic surgery: a randomized trial. *J Vasc Surg* 2005; **42:** 654 – 659.
15. St. Peter SD, Valusek PA, Little DC, Snyder CI, Holcomb III GW, Ostlie DJ. Does routine nasogastric tube placement after an operation for perforated appendicitis make a difference? *J Surg Res* 2007; **143:** 66 – 69.
16. Yoo CH, Son BH, Han WK, Pae WK. Nasogastric decompression is not necessary in operations for gastric cancer: prospective randomised trial. *Eur J Surg* 2002; **168:** 379–383.
17. Ocen W, Kakane I, Sebbaale A. Routine versus selective postoperative nasogastric suction in Mulago Hospital. *East Cent Afr J Surg* 2005; **9:** 78–83.
18. Pearl ML, Valea FA, Fischer M, Chalas E. A randomised controlled trial of postoperative nasogastric tube decompression in gynecologic oncology patients undergoing intra-abdominal surgery. *Obstet Gynecol* 1996; **88:** 399–402.
19. Carrère N, Seulin P, Julio CH, Bloom E, Gouzi J-L, Pradère B. Is nasogastric or nasojejunal decompression necessary after gastrectomy? A prospective randomized trial. *World J Surg* 2007; **31:** 122 – 127.
20. Nathan BN, Pain JA. Nasogastric suction after elective abdominal surgery: a randomised study. *Ann R Coll Surg Eng* 1991; **73:** 291–294.
21. Verma R, Nelson RL. Prophylactic nasogastric decompression after abdominal surgery (Review). Cochrane Database of Systematic Reviews 2007, Issue 3. Art No.: CD004929.DOI: 10.1002/14651858. CD004929.pub3.
22. Lewis SJ, Egger M, Sylvester PA, Thomas S. Early enteral feeding versus "nil by mouth" after gastrointestinal surgery: systematic review and meta-analysis of controlled trials. BMJ 2001; **323:** 1–5.
23. Andersen HK, Lewis SJ, Thomas S. Early enteral nutrition within 24h of colorectal surgery versus later commencement of feeding for post-

operative complications. Cochrane Database of Systematic Reviews 2006, Issue 4. Art. No.: CD004080.DOI: 101002/14651858.CD004080.pub2.

24. Han-Guerts IJM, Hop WCJ, Kok NFM, Lim A, Brouwer KJ, Jeekel J. Randomized clinical trial of the impact of early enteral feeding on postoperative ileus and recovery. *Br J Surg* 2007; **94:** 555–561.
25. Delaney CP, Zutshi M, Senagore AJ, Remzi FH, Hammel J, Fazio VW. Prospective, randomised, controlled trial between a pathway of controlled rehabilitation with early ambulation and diet and traditional postoperative care after laparotomy and intestinal resection. *Dis Colon Rectum* 2003; **46:** 851–859.
26. Reissman P, Teoh T-A, Cohen SM, Weiss EG, Nogueras JJ, Wexner SD. Is early oral feeding safe after elective colorectal surgery? *Ann Surg* 1995; **222:** 73–77.
27. Charoenkwan K, Phillipson G, Vutyavanich T. Early versus delayed oral fluids and food for reducing complications after major abdominal gynaecologic surgery (Review). Cochrane Database of Systematic Reviews 2007, Issue 4. Art. No.: CD004508. DOI: 10.1002/14651858. CD004508.PUB3.
28. Schilder JM, Hurteau JA, Look KY, Moore DH, Raff G, Stehman FB *et al.* A prospective controlled trial of early postoperative oral intake following major abdominal gynecologic surgery. *Gynecol Oncol* 1997; **67:** 235–240.