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ORIGINAL ARTICLE

Tube Laparostomy as Initial and Sole Intervention for Neonates with Idiopathic Pneumoperitonium.

Roshan Ali[1], Nabi Bux Napar[2], Ishrat Mahtam[3], Farah Mahar[4], Sirajuddin Soomro[5], Noor Ahmed[6]

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ABSTRACT… Objective: To determine the efficacy of tube laparostomy an initial and sole surgical intervetion in neonates diagnosed with idiopathic pneumoperitonium. **Study Design:** Retrospective study. **Setting:** Department of Pediatric Surgery, Ghulam Muhammad Mahar Medical College Sukkur and Department of Pediatric Surgery, Chandka Medical College Larkana. **Period:** 1st April 2020 till 30th March 2023. **Material & Methods:** Tube laparostomy was done in Operation Theater under local anesthesia in all neonates with pneumoperitonium. After the procedure all patients were kept in neonatal intensive care unit for close observation. Patients draining gut contents in the drain underwent exploratory laparotomy while who clinically improved with only serous discharge in the drains and recovered smoothly were labeled as cases of idiopathic or benign pneumopertonium. Data was collected that included, age, gender, weight, efficacy of the procedure, need to do exploratory laparotomy, post-operative pain scores assessed with the help of neonatal infant pain assessment, total hospital stay length and mortality. **Results:** A total of 178 cases of neonatal pneumoperitonium were diagnosed during the study period. Out of these 178 cases only 23 (12.92%) were labelled as idiopathic pneumoperitonium on the basis of absence of gut contents in the drainage. Out of these 23 cases, 22 (95.65%) were successfully treated with laparostomy and one case was proceeded with exploratory laparotomy. Post procedure NIPS score remained low and favorable with mean and standard deviation of 1.83±1.4. Total length of hospital stay ranged from 4 days to 15 days. Mean and standard deviation of hospital stay was 6.22±2.8 days. **Conclusion:** It is concluded in our study that tube laparostomy in cases of idiopathic pneumoperitonium is very efficacious treatment option. This procedure is is easy to do, can be safely done in critically ill patients, can be done under local anesthesia, results in lesser post-operative pain scores and reduces the hospital stay length and cost of treatment.

Key words: Benign Pneumoperitonium, Idiopathic Pneumoperitonium, Neonates, Tube Laparostomy.

INTRODUCTION

Pneumoperitonium can be defined as presence of free gas in the peritoneal cavity.[1] In majority of the cases it is caused by perforation of the gut.[2] In such cases, immediate surgical intervention is required.[3] In remaining cases its cause is not clearly known and it is called idiopathic or spontaneous peritoneum.[4] This condition is rare and many inexperienced surgeons proceed with the laparotomy. However many researchers have tried the non-surgical management plan for these cases.

Pathophysiology of idiopathic penumoperitonium is not very well understood.[5] Diagnosis is made with excluding all other common causes of pneumoperitonium including gut perforation, gynecological causes, iatrogenic causes, etc. An x-ray abdomen done in erect posture is one of the most sensitive and cost effective diagnostic tool in detecting free gas in the peritoneal cavity.

Signs and symptoms of idiopathic pneumoperitonium may include nausea, vomiting, abdominal distension, and abdominal discomfort but signs and symptoms of peritonitis will be absent and inflammatory markers will also be not raised.[6] Treatment options include conventional laparotomy and tube laparostomy. Conventional laparotomy is very high risk procedure, carries the risk of prolonged hospital stay, increased cost of treatment, increased post-operative pain due

1. MBBS, FCPS (Pediatric Surgery), Senior Registrar Pediatric Surgery, SMBBMU, Larkana.
2. MBBS, FCPS (Pediatric Surgery), Assistant Professor Pediatric Surgery, GMMMC, Sukkur.
3. MBBS, FCPS (Pediatric Surgery, Assistant Professor Pediatric Surgery, SMBBMU, Larkana.
4. MBBS, FCPS (Pediatric Surgery), Registrar Surgery, GMMMC, Sukkur.
5. MBBS, FCPS (Pediatric Surgery), Professor Pediatric Surgery, SMBBMU, Larkana.
6. MBBS, FCPS (Pediatric Surgery), Professor Pediatric Surgery, GMMMC, Sukkur.

Correspondence Address:
Dr. Nabi Bux Napar
Department of Pediatric Surgery,
GMMMC, Sukkur.
nabibux.napar@yahoo.com

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to large incision, increased healing time.[7] Other treatment option include tube laparostomy.[7] Very few researchers have tried this management option, and data on this subject is very scarce. Though tube laparostomy has in practice for a very long time for other conditions like initial management step for gut perforation till the patient is resuscitated and prepared for surgery[8], for emergency drainage of retroperitoneal abscess[9] excreta.

This study was conducted to observe the efficacy of tube laparostomy in neonates diagnosed with idiopathic pneumoperitonium. If the results of this study are favorable then this management option will provide safer, easy to do, less invasive treatment option in cases of idiopathic penumoperitonium. This management plan will help reduce the hospital stay, cost of treatment and lesser requirement of post-operative analgesics as it involves a small incision as compared to the conventional laparotomy.

MATERIAL & METHODS

This retrospective study was conducted in pediatric surgery department Ghulam Muhammad Mahar Medical College Sukkur and Pediatric surgery department Chandka Medical College Larkana from 1st April 2020 till 30th March 2023. Approval from Ethical Review Board of the institute was taken (Certificate no. GMMMC/Suk/Esst: Br/103). Patients of age 28 days or less of either gender diagnosed with idiopathic pneumoperitonium were selected for this study.

All cases of neonatal pneumoperitonium presented to pediatric surgery department were prepared for tube laparostomy. After preparation all patients were shifted to Operation Theater for the procedure. Written informed consent was taken from the parents of the patients for the said procedure. Tube laparostomy was done under local anesthesia under aspectic conditions. After the procedure all patients were kept in neonatal intensive care unit for close observation. Patients draining gut contents in the drain underwent exploratory laparotomy while who clinically improved with only serous discharge in the drains and recovered smoothly were labeled as cases of idiopathic or benign pneumopertonium. Collected data including efficacy of the procedure, need to do exploratory laparotomy, post-operative pain scores assessed with the help of neonatal infant pain assessment scale (NIPS) as shown in Table-I below[10], total hospital stay length and mortality were recorded on a specially designed data collection proforma. Collected data was computed with the help of Statistical Package for Social Sciences (SPSS) version 23 for windows. Categorical variable like gender, efficacy of the treatment, need to do exploratory laparotomy and mortality were presented as frequency and percentage, whereas quantitative variables like age, weight, hospital stay length, NIPS score, are presented as mean and standard deviation.

Pain Assessment Tool		Score
Facial Expression	Relaxed Muscles	0
	Grimace	1
Cry	Quiet	0
	Whimper	1
	Vigorous Cry	2
Breathing Pattern	Usual Pattern, relaxed	0
	Indrawing, irregular, faster, gagging, breath holding	1
Arms	Relaxed with no muscular rigidity	0
	Tense, rigid, straight, rapid extension, flexion	1
Legs	Relaxed with no muscular rigidity	0
	Tense, rigid, straight, rapid extension, flexion	1
State of Arousal	Awake or asleep but quiet	0
	Alert, thrashing and restless	1

Table-I. Neonatal infant pain assessment scale

Score of two or less indicates no or mild pain, score between 3 to 4 imply moderate pain and score of greater than 4 indicates severe pain.

RESULTS

During three years of study period, a total of 178 cases of neonatal pneumoperitonium were diagnosed in pediatric surgery department of Ghulam Muhammad Mahar Medical College and Pediatric surgery department Chandka Medica College Larkana. Out of these 178 cases only 23 (12.92%) were labelled as idiopathic pneumoperitonium on the basis of absence of

gut contents in the drainage.

Mean age at the time of presentation in hospital of these 23 cases labelled as idiopathic pneumoperitonium was 7.52±3.12 days. Age range of these cases was 4 to 14 days. Out of these 23 cases, 13 (56.52%) were male while 10 (43.48%) were female with male to female ratio of 1:1.3. Majority of the patients had a weight of less than 3 kg. Weight ranged from 2.2 to 3.2 kg with mean and standard deviation of 2.7±0.28 kg. Details of the demographic data are shown in Table-II below.

Demographic Characteristic	Value
Age in days (Mean±SD)	8.52±3.62
Weight in Kgs (Mean±SD)	2.7±0.28
Gender (Male to female Ratio)	1:1.3

Table-II. Demographic data of patients

Regarding the effectiveness of the tube laparostomy in these 23 cases, 22 (95.65%) cases were successfully managed with this technique only one (4.35%) patient had treatment failure and this case proceeded to exploratory laparotomy but no obvious gut perforation was found during the laparotomy. This patient deteriorated with time and unfortunately couldn't survive and died on 13th day of admission. This was the only case (4.35%) of treatment failure and mortality out of 23 cases.

Post procedure NIPS score remained low and favorable with mean and standard deviation of 1.83±1.4. Further details of NIPS Score are shown in Table-III below.

Pain Category	Number of Patients (n=23)
No or Mild (0-2)	17 (73.91%)
Moderate (3-4)	4 (17.39%)
Severe (5 or above)	2 (8.7%)

Table-III. Post Procedure Neonatal Infant Pain Scale (NIPS) Score

Total length of hospital stay ranged from 4 days to 15 days. Mean and standard deviation of hospital stay was 6.22±2.8 days.

DISCUSSION

The incidence of pneumoperitonium in neonates can range from as low as 7.8% as reported by Gupta R and as high as 16.5% as reported by Khan TR et al[11-12] Its etiology varies, and mostly results from rupture of a hollow viscus. However, very rarely in about 10% of such cases, it is the result of unknown etiology and termed as idiopathic pneumoperitonium.[13] Idiopathic penumoperitonium in neonates is usually a benign condition and can be easily managed with tube laparostomy without the need to do exploratory laparotomy.[14-15] It is therefore very important that the condition is diagnosed timely as the management differ drastically and preventing the need to do exploratory laparotomy in cases of idiopathic pneumoperitonium.

In our study we found out that incidence of idiopathic pneumoperitonium is about 12.92% in neonates presenting in hospital with pneumoperitonium. There are very few studies done on this subject. However studies done on the subject report an incidence of about 8 to 12 percent which is comparable to our results.[15-16]

In our study, we found out that tube laparostomy is highly efficacious in managing neonates with idiopathic pneumoperitonium. In our study, 23 out of 22 cases were successfully treated with this procedure with efficacy of 95.65%. In a study conducted by Pandit GS et al. at Children Hospital, Pakistan Institute of Medical Sciences Islamabad showed the efficacy of this procedure to be 81.5% which is a little lower as compared to our results.[7] In a similar study conducted by Gupta R, demonstrated an efficacy of 100%.[11]

In our study, majority of the patients had mild pain post procedure as measured with the NIPS. In a similar study by Pandit GS et al. observed the neonates for pain after tube laparostomy.[7] They used a different tool for measurement of post procedure pain i-e Visual Analogue Scale but the results were comparable. In their study mean scores were 0.9±1.6 (Mild Pain) in cases of tube laparostomy versus 4.2± 2.53 (Moderate pain) in cases of laparotomy. In our study we observed a mean hospital stay of 6.22 days where as it was 3.9 days for laparostomy and 6.2 days for laparotomy patients in above mentioned study.[7]

Very few researchers have shown interest on this topic, may be because of the lower incidence of the condition. Many case reports have been published that have demonstrated the successful management of idiopathic pneumoperitonium with tube laparostomy in neonates but very few research articles have been published.[17-18] One possible limitation of our study could be the small sample size, and the reason for this is the very low incidence of this condition.

CONCLUSION

It is concluded in our study that tube laparostomy in cases of idiopathic pneumoperitonium is very efficacious treatment option. This procedure is is easy to do, can be safely done in critically ill patients, can be done under local anesthesia, results in lesser post-operative pain scores and reduces the hospital stay length and cost of treatment.

RECOMMENDATIONS

It is recommended that further studies should be done to know the exact etiology of idiopathic pneumoperitonium in neonates so that either it can be prevented or can be treated non-invasively under understanding the exact etiology.

REFERENCES

1. Grewal JS, Mayer S, Beaty J, Formaro D. **A rare case of spontaneous idiopathic Pneumoperitoneum presenting as abdominal pain.** Cureus. 2021; 13(5): e15158. doi:10.7759/cureus.15158

2. Velez, D. R. **Recurrent idiopathic spontaneous Pneumoperitoneum: A case report.** Cureus. 2022; 14(6): e26471. doi:10.7759/cureus.26471

3. Udelsman B, Lee K, Qadan M, Lillemoe KD, Chang D, Lindvall C, Cooper Z. **Management of pneumoperitoneum: Role and limits of nonoperative treatment.** Annals of Surgery. 2021; 274(1):146-154. doi.org/10.1097/sla.0000000000003492

4. Sidiqi MM, Fletcher D, Billah T. **The enigma of asymptomatic idiopathic pneumoperitoneum: A dangerous trap for general surgeons.** International Journal of Surgery Case Reports. 2020; 76(1):33-36. doi.org/10.1016/j.ijscr.2020.09.149

5. Williams NM, Watkin DF. **Spontaneous pneumoperitoneum and other nonsurgical causes of intraperitoneal free gas.** Postgraduate Medical Journal. 1997; 73(863):531-537. doi.org/10.1136/pgmj.73.863.531

6. He TZ, Xu C, Ji Y, Sun XY, Liu M. **Idiopathic neonatal pneumoperitoneum with favorable outcome: A case report and review.** World Journal of Gastroenterology: WJG. 2015; 21(20):6417-6421. doi.org/10.3748/wjg.v21.i20.6417

7. Pandit GS, Pandit RK, Mehmood F, Burki N, Abbasi RN, Zahra F, et al. **Compare the outcomes of laparotomy versus laparostomy tube in neonates presented with pneumoperitoneum.** P J M H S. 2022; 16 (7):623-625. doi.org/10.53350/pjmhs22167623

8. Azhar M, Zamir N, Shaikh M, Ullah I. **Enteric fever complicated by intestinal perforation in children: A persistent health problem requiring surgical management.** Pakistan Journal of Medical Sciences Quarterly. 2020; 36(5):890-893. doi.org/10.12669/pjms.36.5.2270

9. Gui D, Azaretto M, Sganga G. **Retroperitoneal laparostomy as an effective emergency treatment of abscess and multiple organ failure after blunt duodenal trauma: Report of a case.** The Journal of Trauma: Injury, Infection, and Critical Care. 1995; 38(1):8–10. https://doi.org/10.1097/00005373-199501000-00004

10. Sarkaria E, Gruszfeld D. **Assessing neonatal pain with NIPS and COMFORT-B: Evaluation of NICU's staff competences.** Journal de La Societe Canadienne Pour Le Traitement de La Douleur [Pain Research & Management]. 2022; 2022(1):1-9. https://doi.org/10.1155/2022/8545372

11. Gupta R. **Spontaneous pneumoperitoneum in pediatric patients: Dilemmas in management.** Journal of Indian Association of Pediatric Surgeons. 2018; 23(3):115. doi:10.4103/jiaps.jiaps_221_17

12. TR, Rawat JD, Ahmed I, Rashid KA, Maletha M, Wakhlu A, Kureel SN. **Neonatal pneumoperitoneum: a critical appraisal of its causes and subsequent management from a developing country.** Pediatric surgery international. 2009; 25(12):1093-1097. https://doi.org/10.1007/s00383-009-2488-6

13. Wang H, Batra V. **Massive Pneumoperitoneum presenting as an incidental finding.** Cureus. 2018; 10(6): e2787. doi:10.7759/cureus.2787

14. Abdelmohsen SM, Osman MA. **Idiopathic neonatal pneumoperitoneum, a case report.** International Journal of Surgery Case Reports. 2017; 31(1):250-253. doi:10.1016/j.ijscr.2017.01.053

15. He T. **Idiopathic neonatal pneumoperitoneum with favorable outcome: A case report and review.** World Journal of Gastroenterology. 2015; 21(20):6417. doi:10.3748/wjg.v21.i20.6417

16. Kim S, Cho Y, Kim H. **Distinctive clinical features of spontaneous pneumoperitoneum in neonates: A retrospective analysis.** World Journal of Clinical Cases. 2022; 10(23):8124-8132. doi:10.12998/wjcc.v10.i23.8124

17. Chibani I, Nouira F, Marzouki M, Ben Ahmed Y, Boukesra T, Charieg A, Jlidi S. **Idiopathic neonatal pneumoperitoneum.** Journal of Pediatric Surgery Case Reports. 2021; 64(1), 101697. doi:10.1016/j.epsc.2020.101697

18. Al-Taher, R, Mansour H, Al-Qaisi M, Hamdan E, Danoun B, Shrouf A, et al. **Spontaneous pneumoperitoneum in neonates: A case series.** Annals of Pediatric Surgery. 2022; 18(1):1-5. https://doi.org/10.1186/s43159-022-00170-7.

AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Roshan Ali	Concept, Design, Data collection, Drafting, Data anlaysis, Overall supervision of the study.	
2	Nabi Bux Napar	Concept, Design, Data collection, Data analysis.	
3	Ishrat Mahtam	Data collection, Drafting, Data analysis.	
4	Farah Mahar	Design, Data collection, Drafting.	
5	Sirajuddin Soomro	Data collection, Data analysis.	
6	Noor Ahmed	Data collection, Data analysis.	