Review Article

A Review of the Conservative Management of Adhesive Intestinal Obstruction in Low Resource Centres

Abstract

Adhesions are common following abdominal surgeries usually after about a few years from the previous Surgical procedures. This review aims to summarize the latest evidence and clarify previous uncertainties, specifically regarding the duration of conservative treatment, and the reliability of conservative management in low-resource countries like Nigeria. Previous pieces of literature were searched online and current reported management options were explored. The management options for adhesive intestinal obstruction AIO could be non-operative (conservative management) or operative treatment. A trial of non-operative management is recommended in all patients except those with signs of peritonitis, strangulation, or bowel ischemia which would have been diagnosed during physical examination and imaging. However, in poor resource countries where prompt access to imaging is not feasible, a surgical option often results from failed conservative treatment. Whereas such patients were candidates for surgical treatment ab into where resources were available. Relapse and recurrence are universal in patients with AIO; once an adhesion, always an adhesion. As the number of (re)admissions increases, recurrence risk increases and the disease- free interval between recurrences decreases. This is one of the banes of AIO; more is needed to be done to reduce the incidence and re-occurrence, especially in low-resource countries.

Keywords: Adhesive Intestinal Obstruction, Conservative Management, Low Resource Centres

Introduction

Adhesive intestinal obstruction (AIO) is a significant surgical presentation with approximately 30% requiring surgery during admission.[1] Adhesions are common following abdominal surgeries usually after about 3 years from the previous Surgical procedures.[2,3]Peritoneal adhesions are scar tissue that forms between abdominal organs, the mesentery, and the abdominal wall as a result of trauma generally due to surgical procedures.[4] This condition accounts for 60%-70% of bowel obstruction cases, defined as a mechanical obstruction that prevents the transit or progression of intestinal contents.[5]

After peritoneal damage, inflammatory cell leakage occurs increasing vascular permeability, activating the complement and coagulation cascade, and releasing pro-inflammatory cytokines. Fibrin is produced to repair damaged tissue, and it is deposited along peritoneal macules. Surrounding organs or damaged serosal surfaces merge as a result. Under normal circumstances, the fibrinolytic system's locally produced proteases break down this filmy fibrous adhesion within 72 hours after the injury. Within 4 to 5 days, fibrinolysis enables mesothelial cells to multiply and the restoration follows. The fibrin matrix persists if fibrinolysis does not take place within 5-7 days. Collagen-secreting fibroblasts enter the matrix and gradually organize into vascular structures over time. Naturally, the fibrinogenetic and fibrinolytic systems are in equilibrium however, in peritoneal insult, the fibrinolytic systems are depressed leading to the formation of adhesions.[6]

Intestinal obstruction by adhesions accounts for 25% of consultations to the surgical emergency departments associated with acute abdominal pain, generating a high risk of iatrogenic injury by emergency reinterventions. Radiation therapy, endometriosis, inflammation, and the body's response to tumours are among other factors that can harm the peritoneum and lead to the development of adhesions in patients who have not been previously operated on. There have also been reports of adhesions in patients with no previous surgery as well as no other identifiable risk factors, such patients are identified as patients with the virgin abdomen, the aetiology of this isn't fully understood but has been linked to likely previously unrecognized inflammations amongst other factors.[7]

The surgical technique, the area to be operated on, and the number of previous surgical procedures have been suggested as associated factors, however, no direct relationship has been found with the origin of peritoneal adhesions.[5,8,9]

An alternative to determine the need for surgical treatment is providing conservative medical management first and then assessing patients' responses within 12-72 hours.[9] The great challenge of adhesive small bowel obstruction (ASBO) management is the early detection of silent intestinal ischemia in patients initially deemed suitable for conservative therapy.[1]

This review aims to summarize and clarify previous uncertainties, specifically regarding the duration of conservative treatment, and the timing and reliability of conservative management in low-resource countries like Nigeria.

Conceptual Literature Review

A Review of Etiology and Risk Factors

Adhesive Intestinal Obstruction (AIO) is a clinical condition characterized by partial or complete obstruction of the small or large intestine due to the formation of adhesions.[10] Adhesions are fibrous tissues that form after abdominal or pelvic surgery and can cause the intestine to become attached to other organs or the abdominal wall. Surgical intervention is the most common cause of AIO. The risk of adhesion formation is influenced by several factors, including the number of surgeries, the length of surgery, and the presence of infection or inflammation during or after surgery.[10]

Chronic diseases, such as endometriosis, Crohn's disease, and diverticulitis, can also increase the risk of AIO by causing inflammation and irritation in the abdomen. Anatomic factors, such as hernias, tumours, and congenital anomalies, can also contribute to the formation of adhesions and increase the risk of AIO. In addition to the abovementioned factors, smoking, age, and using certain medications have also been associated with an increased risk of AIO. Not all individuals with risk factors will develop AIO, and some individuals with no known risk factors may still develop the condition.[1]

Further research is needed to understand the aetiology and risk factors of AIO fully. A better understanding of the aetiology and risk factors of AIO is essential for the development of effective strategies for the management and prevention of the condition. Further studies are needed to provide more insight into the underlying mechanisms of AIO and to identify potential new therapies for the treatment of the condition.

Current Management Strategies for Adhesive Intestinal Obstruction

Adhesive Intestinal Obstruction: Conservative Measures

Conservative measures are the initial approach for managing AIO, aimed at resolving the obstruction without needing surgery.[11] One of the primary conservative measures for AIO is bowel rest, in which oral intake is withheld, and intravenous fluids and electrolytes are provided. This allows the affected portion of the intestine to rest, reducing inflammation and improving intestinal motility, which can relieve the symptoms of the obstruction.

Pain control is another important aspect of conservative management for AIO. This can be achieved by using nonsteroidal anti-inflammatory drugs or opioids, depending on the severity of the pain. Pain control helps to improve patient comfort and reduce the risk of exacerbating the obstruction. In some cases, bowel-directed agents, such as laxatives or enemas, may also be used as part of the conservative management of AIO. However, these agents are used with caution, as they may worsen the symptoms of the obstruction in some patients.[12,13]

Both approaches have advantages and limitations, and a multidisciplinary approach that considers both options is necessary to optimize patient outcomes.[11] Conservative measures, such as bowel rest and pain control, aim to relieve the symptoms of AIO without the need for surgery.

This approach offers several advantages, including reduced risk of postoperative complications, improved patient comfort, and cost-effectiveness. In some cases, conservative management may be sufficient to resolve the obstruction, and surgery may not be necessary. However, in some cases, conservative management may be insufficient to resolve the symptoms of AIO. In these cases, surgical intervention may be required. Surgical interventions for AIO can include laparoscopic or open adhesiolysis and aim to resolve the obstruction directly.[14,15] The advantage of surgery is that it offers a more direct approach to resolving the obstruction, resulting in a faster resolution of symptoms and a shorter recovery time. However, surgical intervention carries certain risks, including postoperative complications and a longer hospital stay. The decision to pursue surgical intervention for AIO must be made case-by-case, considering the patient's clinical situation, comorbidities, and personal preferences.

Adhesive Intestinal Obstruction: Surgical Interventions

In cases where conservative management is not effective or if the obstruction is complete, surgical intervention is often required. The surgical intervention aims to relieve the obstruction and prevent future adhesion formation[10]. Laparoscopic surgery is a minimally invasive surgical approach that has become increasingly popular for the management of AIO. The laparoscopic approach has several benefits, including reduced pain, faster recovery, and lower rates of adhesion formation compared to traditional open surgery.[16]

Open surgery is another option for the management of AIO. In this procedure, a larger incision is made in the abdominal wall, allowing the surgeon to visualize and relieve the obstruction directly. Open surgery is typically recommended in cases where the obstruction is extensive or laparoscopic surgery is impossible due to the patient's health status or other factors.[14]

Regardless of the surgical approach used, adhesion prevention measures are an important aspect of the management of AIO. This can include the use of barriers and anti-adhesive agents during surgery, which help prevent the formation of adhesions and reduce the risk of future obstructions.[13,16]

The Role of New Technologies and Treatments

Adhesive Intestinal Obstruction (AIO) poses a significant challenge to clinical/surgical practices and patients.[16] The introduction of new technologies and treatments has opened up new avenues for the management of AIO. Laparoscopic surgery, a minimally invasive technique, has become a popular option for the surgical resolution of AIO. The benefits of this technique include reduced postoperative pain, shorter recovery time, and improved cosmetic outcomes.

Other novel technologies, such as endoscopic lysis and tissue adhesives, are being explored for their potential to treat AIO.[17] Endoscopic lysis involves using an endoscope to break down adhesions and relieve the obstruction, while tissue adhesives, such as fibrin glue, aim to reduce adhesions and prevent the recurrence of AIO. It is important to note that these technologies are still in the early stages of development, and further research is necessary to understand their efficacy and safety.

Role of patient-specific factors

Effective management of this condition requires a thorough understanding of patient-specific factors that can impact the course of the disease and the effectiveness of treatment options. Patient age is a crucial factor that must be considered in managing adhesive intestinal obstruction. The elderly population is at an increased risk of developing this condition due to a greater frequency of abdominal surgeries and a higher likelihood of underlying medical conditions. Thus, it is imperative for healthcare providers to closely monitor and manage this population to minimize the risk of adverse outcomes.[18,19]

Patients with comorbidities such as diabetes, renal failure, or immunocompromise are at an increased risk of developing complications from this condition and may require more aggressive interventions to resolve their symptoms. Past medical history, including prior abdominal surgeries, is another key factor that must be considered. The number and type of prior surgeries, as well as the timing of the current obstruction, can significantly impact the severity and progression of adhesive intestinal obstruction. Careful evaluation of this history is essential for developing an effective management strategy.

The location and extent of adhesive disease is also a crucial factor that must be considered in the management of this condition. Patients with more extensive or complex adhesive disease may require more aggressive interventions, such as laparoscopic or open surgical adhesiolysis, to effectively resolve their symptoms. On the other hand, patients with less severe or simpler cases may be able to be managed with minimally invasive techniques or observation.

Future Directions for Research and Clinical Practice

The current standard of care for AIO is surgical adhesiolysis. However, non-surgical interventions such as the use of pharmacological agents and endoscopic techniques are being explored as potential alternative treatments.[19,20] The effectiveness and safety of these interventions in managing AIO require further investigation. Minimally invasive surgical techniques, such as laparoscopic surgery, are becoming increasingly popular for the management of AIO. However, there is limited data available on the long-term outcomes and safety of these techniques. Further investigation is needed to determine the most effective approach for managing AIO.

Prevention of adhesion formation is also an important area of investigation. AIO is a common complication of abdominal surgeries, and strategies to prevent the formation of adhesions are of growing interest. The most effective approaches for preventing adhesion formation, including using barrier agents and other preventative measures, require further investigation. Quality of life outcomes is another important area of investigation. AIO can have a significant impact on a patient's quality of life, and further research is needed to determine the long-term impact of this condition and to identify strategies for optimizing the quality-of-life outcomes. Outcome prediction models also potentially improve patient outcomes by helping healthcare providers make informed decisions regarding treatment and management. The development and validation of predictive models for AIO require further investigation.

Discussions

The management options for AIO could be non-operative (conservative management) or operative treatment. A trial of non-operative management is recommended in all patients with AIO unless there are signs of peritonitis, strangulation, or bowel ischemia which would have been diagnosed during physical examination and imaging.[21]

Correcting fluid and electrolyte imbalance is an initial crucial step to mitigate severe hypovolemia. Fluid resuscitation by isotonic crystalloids (e.g., lactated Ringer's solution or normal saline) should be done simultaneously with the diagnostic workup. The cornerstone of non-operative management is *nils* per oris and abdominal decompression using a nasogastric tube (NGT) or long intestinal tube. An NGT is easier to insert but is less effective in decompressing the distal part of the small bowel. Long intestinal tubes can achieve distal decompression. However, the insertion of long intestinal tubes requires endoscopy or fluoroscopy and can lead to regurgitation, vomiting, and respiratory and abdominal distress along with the potential risk of aspiration pneumonia.

In the case of failed conservative treatment, the length or duration taken for conservative management has been affected by several factors including the availability of managing resources, financial constraints, and skilled surgeons. All these played varying roles before conservative management was converted into the surgical option. It has been observed that most patients suffer unnecessarily prolonged hospital stays due to one or a constellation of limiting conditions. The risk of depression, wasting in bed, and other social challenges following discharge increases. Therefore, in addition to effective fluid management and correction of electrolyte derangement, nutritional support is of great importance, and aspiration prevention must be carefully monitored.[13,22] Because some patients tend to have improved a few days following the initiation of conservative treatment, but relapsed a few hours following extubating. Such patients are re-intubated increasing their risk of aspiration pneumonitis.

Another unique treatment that has become commonplace over the last few years is the use of water-soluble contrast after conservative management. The most widely used agent is Gastrografin. It has a very high osmolality and acts by drawing water into the lumen of the small bowel, decreasing wall oedema, and stimulating intestinal motility. It is safe and non-irritant to the peritoneal cavity of patients (including pediatric patients).[6]A clinical trial conducted by Bonnard *et al* found that the addition of Gastrografin to the conservative treatment regimen increased the rate of treatment success from 50% to 75%.[22,23]Gastrografin speeds resolution and decreases hospital stay without any significant morbidity. In addition, a delayed film between 4 and 24 hours after administration of contrast will show whether or not the contrast has arrived in the caecum. If the contrast has not arrived in the caecum within 24 h there is a very high likelihood that the patient will not settle with further conservative management and these patients should be offered surgery.[23]

If the patient remains stable clinically then a conservative approach can be tolerated almost indefinitely as long as nutrition can be provided.[13] Most authors and panels consider a 72-hour period the safe and appropriate duration of non-operative (conservative) treatment.[10] Although

some other authors suggest a cut-off of 48 hours the use of Gastrografin enables this decision to be taken within 24 hours of admission.[21,23]

For those patients whose symptoms do not resolve with conservative management, or in whom ischemia, peritonitis, or strangulation is suspected, surgery is required. Historically, open abdominal surgery (explorative laparotomy with adhesiolysis) has been the standard treatment for adhesive intestinal obstruction. Laparoscopic surgery has however replaced laparotomy as a more technically feasible option. Although the desired decrease in recurrence rate has not yet been convincingly demonstrated with laparoscopy, it has shown some potential benefits, including less extensive adhesion (re)formation, earlier return of bowel movements, reduced post-operative pain, surgical site infection, and shorter length of hospital stay.[21]

Although laparoscopy might provide some benefits to some patients, surgeons must carefully select candidates for laparoscopic treatment. Laparoscopy in an abdomen with very distended loops of bowel and multiple complex adhesions could increase the risk of severe complications such as enterotomies and delayed diagnosis of perforations. To reduce the risk of iatrogenic bowel injury during laparoscopy, surgeons should avoid grasping the distended loops and handle only the mesentery. Enterotomy in the presence of pneumoperitoneum disseminates rapidly and increases the risk of intra- abdominal abscess.[21,22] Conversely, another guideline suggested that the only absolute exclusion criteria for laparoscopy are patients with contraindications to pneumoperitoneum (e.g., hemodynamic instability or cardiopulmonary diseases), and all other contraindications should be judged on a case-by-case basis depending on the experience of the surgeon.

Conclusion

Several studies show similar results in the recurrence rate. Relapse and recurrence are universal in patients with AIO; once an adhesion, always an adhesion. As the number of (re)admissions increases, recurrence risk increases and the disease- free interval between recurrences decreases.[22]This is one of the banes of AIO; more is needed to be done to reduce the incidence and re-occurrence, especially in low-resource countries.

References

1. Köstenbauer J, Truskett PG. Current management of adhesive small bowel obstruction. ANZ J Surg [Internet]. 2018 Nov 1 [cited 2023 Feb 1];88(11):1117–22. Available from: https://pubmed.ncbi.nlm.nih.gov/29756678/

2. Montz FJ, Holschneider CH, Solh S, Schuricht LC, Monk BJ. Small bowel obstruction following radical hysterectomy: risk factors, incidence, and operative findings. Gynecol Oncol [Internet]. 1994 [cited 2023 Feb 6];53(1):114–20. Available from: https://pubmed.ncbi.nlm.nih.gov/8175009/

3. Ellis H, Moran BJ, Thompson JN, Parker MC, Wilson MS, Menzies D, et al. Adhesion-related hospital readmissions after abdominal and pelvic surgery: a retrospective cohort study. Lancet [Internet]. 1999 May 1 [cited 2023 Feb 6];353(9163):1476–80. Available from: https://pubmed.ncbi.nlm.nih.gov/10232313/

4. Duron JJ. Postoperative intraperitoneal adhesion pathophysiology. Colorectal Disease [Internet]. 2007 Oct [cited 2023 Feb 2];9(SUPPL. 2):14–24. Available from: https://onlinelibrary.wiley.com/doi/full/10.1111/j.1463-1318.2007.01343.x

5. Sykes PA, Schofield PF. Early postoperative small bowel obstruction. British Journal of Surgery [Internet]. 2005 Dec 7 [cited 2023 Feb 2];61(8):594–600. Available from: https://academic.oup.com/bjs/article/61/8/594/6190820

6. Gore RM, Silvers RI, Thakrar KH, Wenzke DR, Mehta UK, Newmark GM, et al. Bowel Obstruction. Radiol Clin North Am. 2015;53(6):1225–40.

7. Amara Y, Leppaniemi A, Catena F, Ansaloni L, Sugrue M, Fraga GP, et al. Diagnosis and management of small bowel obstruction in virgin abdomen: a WSES position paper. World Journal of Emergency Surgery [Internet]. 2021 Dec 1 [cited 2023 Feb 6];16(1):1–9. Available from: https://wjes.biomedcentral.com/articles/10.1186/s13017-021-00379-8

8. Ward BC, Panitch A. Abdominal Adhesions: Current and Novel Therapies. Journal of Surgical Research [Internet]. 2011 Jan 1 [cited 2023 Feb 2];165(1):91–111. Available from: http://www.journalofsurgicalresearch.com/article/S0022480409004739/fulltext

9. Idrobo AA, Bastidas BE, Yasno LM, Vargas AL, Merchán-Galvis ÁM, Idrobo AA, et al. Presentation and outcome of conservative management of intestinal obstruction caused by adhesions in Cauca. Rev Colomb Gastroenterol [Internet]. 2020 Oct 1 [cited 2023 Feb 2];35(4):447–54. Available from: http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0120-99572020000400447&lng=en&nrm=iso&tlng=en

10. ten Broek RPG, Krielen P, di Saverio S, Coccolini F, Biffl WL, Ansaloni L, et al. Bologna guidelines for diagnosis and management of adhesive small bowel obstruction (ASBO): 2017 update of the evidence-based guidelines from the world society of emergency surgery ASBO working group. World Journal of Emergency Surgery. 2018 Jun 19;13(1).

11. Thacker C, Lauer C, Nealon K, Walker C, Factor M. Admitting Service and Outcome for Small Bowel Obstruction. American Surgeon. 2022 Apr 1;88(4):643–7.

12. Deb S, Law-Min R, Fearnley D. Wernicke-Korsakoff syndrome following small bowel obstruction. Behavioural Neurology. 2001;13(3–4):89–94.

13. Foster NM, McGory ML, Zingmond DS, Ko CY. Small Bowel Obstruction: A Population-Based Appraisal. J Am Coll Surg. 2006 Aug;203(2):170–6.

14. Rice AD, Patterson K, Reed ED, Wurn BF, Klingenberg B, King CR, et al. Treating Small Bowel Obstruction with a Manual Physical Therapy: A Prospective Efficacy Study. Biomed Res Int. 2016;2016.

15. Rice AD, King R, Reed ED, Patterson K, Wurn BF, Wurn LJ. Manual Physical Therapy for Non-Surgical Treatment of Adhesion-Related Small Bowel Obstructions: Two Case Reports. J Clin Med [Internet]. 2013 Feb 4 [cited 2023 Feb 20];2(1):1–12. Available from: http://www.ncbi.nlm.nih.gov/pubmed/26237678

16. Tong JWV, Lingam P, Shelat VG. Adhesive small bowel obstruction – an update. Acute Medicine & Surgery [Internet]. 2020 Jan [cited 2023 Feb 20];7(1). Available from: /pmc/articles/PMC7642618/

17. Amara Y, Leppaniemi A, Catena F, Ansaloni L, Sugrue M, Fraga GP, et al. Diagnosis and management of small bowel obstruction in virgin abdomen: a WSES position paper. World Journal of Emergency Surgery. 2021 Dec 1;16(1).

18. Klingbeil KD, Wu JX, Osuna-Garcia A, Livingston EH. Management of small bowel obstruction and systematic review of treatment without nasogastric tube decompression. Surg Open Sci. 2022;

19. Tong JWV, Lingam P, Shelat VG. Adhesive small bowel obstruction – an update. Acute Medicine & Surgery. 2020 Jan;7(1).

20. Podda M, Khan M, di Saverio S. Adhesive Small Bowel Obstruction and the six w's: Who, How, Why, When, What, and Where to diagnose and operate? Scandinavian Journal of Surgery. 2021 Jun 1;110(2):159–69.

21. ten Broek RPG, Krielen P, Di Saverio S, Coccolini F, Biffl WL, Ansaloni L, et al. Bologna guidelines for diagnosis and management of adhesive small bowel obstruction (ASBO): 2017 update of the evidence-based guidelines from the world society of emergency surgery ASBO working group. World Journal of Emergency Surgery. 2018 Jun 19;13(1).

22. Zins M, Millet I, Taourel P. Adhesive small bowel obstruction: Predictive radiology to improve patient management. Radiology [Internet]. 2020 Sep 1 [cited 2023 Jun 1];296(3):480–92. Available from: https://doi.org/10.1148/radiol.2020192234

23. Bonnard A, Kohaut J, Sieurin A, Belarbi N, El Ghoneimi A. Gastrografin for uncomplicated adhesive small bowel obstruction in children. Pediatr Surg Int. 2011 Dec;27(12):1277–81.