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COLOSTOMY IN INFANTS — INDICATIONS, SURGICAL APPROACHES, COMPLICATIONS, AND CURRENT OUTCOMES: A NARRATIVE REVIEW

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ABSTRACT

Infant colostomy remains an essential surgical procedure in neonatal and pediatric surgical practice, serving both temporary and definitive roles in the management of various congenital and acquired gastrointestinal disorders. Common indications include anorectal malformations, Hirschsprung disease, necrotizing enterocolitis, intestinal perforation, meconium disorders, and traumatic bowel injuries. Several colostomy techniques have been described in infants, including loop, divided, and double-barrel colostomies, each with distinct advantages, limitations, and complication profiles. Postoperative complications such as prolapse, skin excoriation, stenosis, retraction, parastomal hernia, and electrolyte imbalance remain common and may significantly affect nutritional status, growth, and quality of life. Furthermore, stoma care in infants presents unique challenges because of delicate skin, small abdominal surface area, and dependence on caregivers. This narrative review summarizes the current indications, operative techniques, perioperative management strategies, complications, and outcomes associated with infant colostomy. Recent advances in neonatal surgical care, stoma appliances, minimally invasive approaches, and enhanced recovery strategies have improved postoperative outcomes.

INTRODUCTION

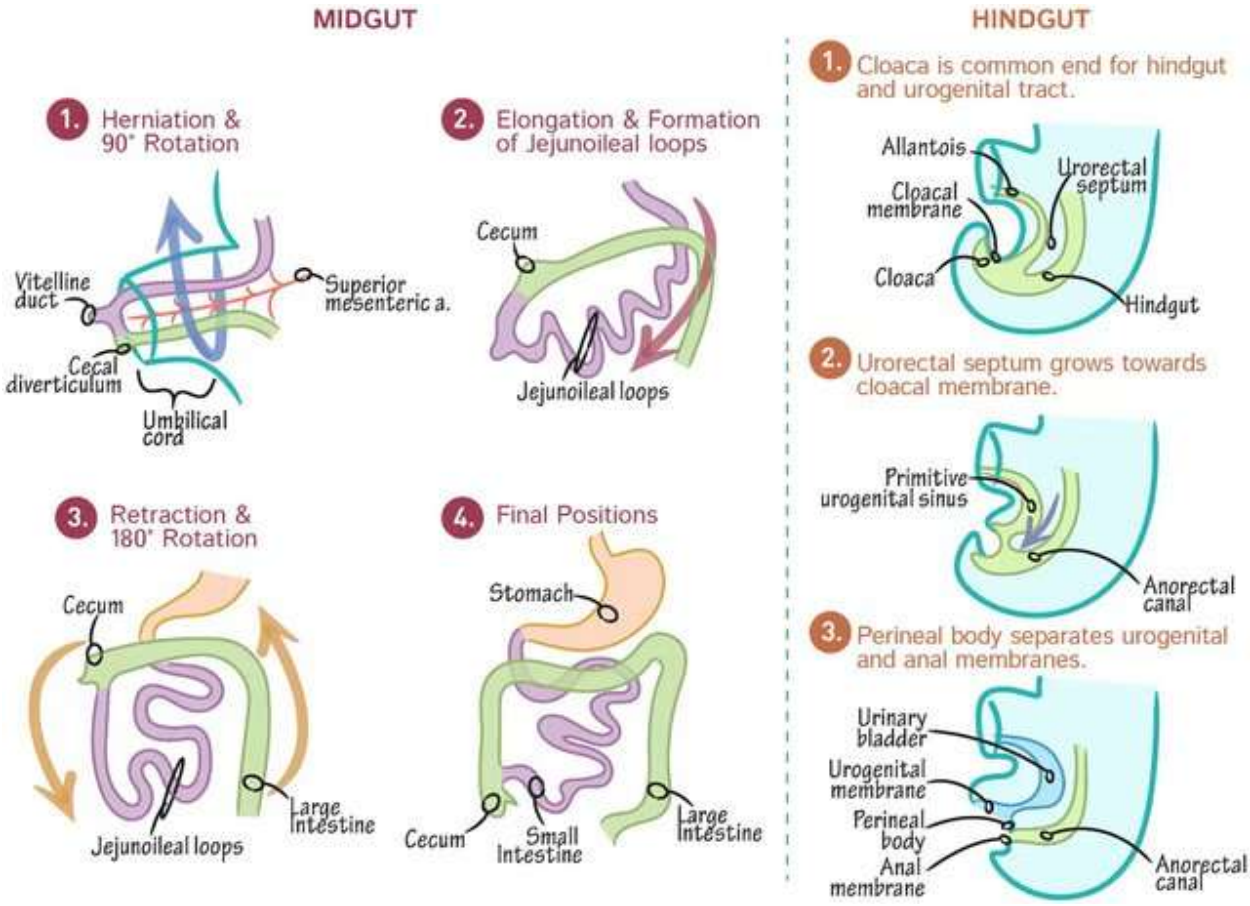
Infant colostomy is one of the most commonly performed procedures in neonatal and pediatric surgical practice .The procedure involves exteriorization of a segment of the colon through the abdominal wall to provide temporary or permanent fecal diversion. In infants, colostomy plays a critical role in the management of several congenital and acquired gastrointestinal disorders, particularly anorectal malformations, Hirschsprung disease, necrotizing enterocolitis, spontaneous intestinal perforation, meconium-related disorders, and traumatic bowel injuries. Although advances in neonatal anesthesia, intensive care, and definitive corrective surgery have reduced the need for staged procedures in selected patients, colostomy continues to remain an indispensable lifesaving intervention in critically ill neonates and infants. The primary objectives of infant colostomy include decompression of the distal bowel, diversion of fecal stream, protection of distal anastomosis, prevention of sepsis, and facilitation of nutritional recovery before definitive repair. Depending on the underlying pathology and surgeon preference, different types of colostomies such as loop, divided, and double-barrel colostomies may be constructed Among these, divided sigmoid colostomy is widely preferred in anorectal malformations because of lower rates of fecal contamination and easier distal washouts.[1,2,3] Despite its therapeutic benefits, infant colostomy is associated with significant morbidity. Complications including prolapse, skin excoriation, stenosis, retraction, parastomal hernia, dehydration, and electrolyte imbalance may adversely affect growth, nutrition, and overall quality of life. Recent advances in neonatal surgery, minimally invasive techniques, stoma appliances, and enhanced perioperative care have improved survival and reduced complication rates in infants undergoing colostomy formation.[5,6,10]

Embryology and Relevant Anatomy

Failure or abnormality of this partitioning process results in anorectal malformations of varying severity, ranging from imperforate anus to complex cloacal anomalies .Arrest of neural crest cell migration leads to aganglionosis, the pathological basis of Hirschsprung disease .The sigmoid colon is the most commonly utilized site for infant colostomy because of its relatively fixed position, ease of exteriorization, and lower complication rates .Proper placement of the stoma through the rectus muscle may reduce the incidence of herniation and improve appliance fitting[4]

Embryology of the Hindgut and Anorectal Region

The primitive gut develops during the fourth week of gestation and is divided into the foregut, midgut, and hindgut. The hindgut gives rise to the distal one-third of the transverse colon, descending colon, sigmoid colon, rectum, and upper anal canal. The terminal hindgut empties into the cloaca, a common cavity shared by the gastrointestinal and genitourinary tracts during early embryonic life.Between the fourth and seventh weeks of gestation, the urorectal septum divides the cloaca into the anterior urogenital sinus and posterior anorectal canal. Failure or abnormality of this partitioning process results in anorectal malformations of varying severity, ranging from imperforate anus to complex cloacal anomalies. The anal membrane normally ruptures by the eighth week of gestation, establishing continuity between the rectum and exterior. Disturbance of these developmental events contributes to congenital anomalies that frequently necessitate temporary colostomy formation. The enteric nervous system develops from neural crest cells that migrate caudally along the gastrointestinal tract. Arrest of this migration leads to aganglionosis, the pathological basis of Hirschsprung disease. The aganglionic segment lacks coordinated peristalsis, resulting in functional intestinal obstruction and colonic dilation proximal to the affected bowel.[4]



Relevant Surgical Anatomy

The colon in infants consists of the cecum, ascending colon, transverse colon, descending colon, sigmoid colon, rectum, and anal canal. Knowledge of colonic blood supply, mesenteric mobility, and abdominal wall anatomy is essential during stoma creation.The arterial supply of the colon originates primarily from the superior and inferior mesenteric arteries. The superior mesenteric artery supplies the cecum, ascending colon, and proximal transverse colon, whereas the inferior mesenteric artery supplies the distal transverse colon, descending colon, sigmoid colon, and upper rectum. Adequate preservation of vascular supply during mobilization is critical to prevent ischemia and stoma necrosis.The sigmoid colon is the most commonly utilized site for infant colostomy because of its relatively fixed position, ease of exteriorization, and lower complication rates. Divided sigmoid colostomy is particularly favored in anorectal malformations because it minimizes fecal contamination of the distal bowel and facilitates distal colostograms prior to definitive repair.The abdominal wall in neonates and infants is thin and underdeveloped, increasing the risk of stoma prolapse and parastomal complications. Proper placement of the stoma through the rectus muscle may reduce the incidence of herniation and improve appliance fitting. In addition, the small abdominal surface area and delicate peristomal skin create challenges in postoperative stoma care and appliance adherence.A comprehensive understanding of embryological development and surgical anatomy is therefore essential for appropriate operative planning, prevention of complications, and successful long-term outcomes in infants undergoing colostomy formation.[3,11]

Indications for Infant Colostomy

Anorectal Malformations:Anorectal malformations (ARMs) represent the most common indication for neonatal colostomy.These congenital anomalies result from abnormal development of the hindgut and cloacal structures during

embryogenesis. Infants with high or intermediate ARM frequently require staged surgical management with an initial diverting colostomy followed by definitive anorectoplasty and later stoma closure. Colostomy helps prevent distal bowel distension, fecal contamination of the urinary tract in fistulous anomalies, and life-threatening sepsis. Divided sigmoid colostomy is generally preferred because it provides effective diversion and facilitates distal colostography before definitive repair.[11,12]

Hirschsprung: DiseaseHirschsprung disease is characterized by congenital absence of ganglion cells in the distal bowel, resulting in functional intestinal obstruction. Although many patients can now undergo primary pull-through procedures, colostomy may still be indicated in critically ill infants, delayed presentations with severe enterocolitis, marked colonic dilatation, perforation, or malnutrition. A leveling colostomy may be created in ganglionated bowel proximal to the transition zone to decompress the colon and improve the infant's clinical condition before definitive surgery.[1,2,4]

Necrotizing Enterocolitis:Necrotizing enterocolitis (NEC) is a severe inflammatory intestinal disease primarily affecting premature and low-birth-weight infants. Surgical intervention becomes necessary in cases of bowel perforation, gangrene, or failure of medical management. Depending on intraoperative findings, creation of a stoma may be preferred over primary anastomosis because of bowel edema, hemodynamic instability, and high risk of anastomotic leak. Enterostomy or colostomy allows diversion of fecal content and facilitates recovery in critically ill neonates.[8,9]

Meconium Disorders:Meconium ileus, meconium plug syndrome, and small left colon syndrome may occasionally require temporary bowel diversion when conservative management fails or bowel perforation occurs. Colostomy or ileostomy can relieve obstruction, decompress the bowel, and permit irrigation of inspissated meconium.[1]

Intestinal Perforation and Sepsis:Spontaneous intestinal perforation, traumatic bowel injuries, and perforations secondary to distal obstruction may necessitate temporary colostomy formation. In unstable neonates, fecal diversion reduces peritoneal contamination and helps control sepsis while allowing recovery prior to definitive reconstruction.[1,2]

Colonic and Rectal Trauma:Although uncommon in infants, traumatic injuries to the colon or rectum resulting from blunt trauma, penetrating injury, or iatrogenic causes may require diversion colostomy to protect distal repair sites and minimize infectious complications.[1,5]

Other Indications
Additional indications for infant colostomy include:
- Cloacal malformations
- Severe perineal infections
- Colonic atresia
- Complex pelvic anomalies
- Protection of distal colorectal anastomosis
- Functional bowel disorders requiring decompression

Thus, infant colostomy remains an essential surgical procedure in neonatal and pediatric practice, particularly in conditions associated with intestinal obstruction, perforation, and congenital anorectal abnormalities.

Types of Colostomy in Infants
Loop Colostomy
Loop colostomy is created by exteriorizing a loop of colon through the abdominal wall and opening its anterior surface to form proximal and distal stoma openings within the same segment. A supporting rod may be temporarily placed beneath the loop to prevent retraction during the early postoperative period.Loop colostomy is technically simple, requires less bowel mobilization, and can be performed rapidly in critically ill infants. It also facilitates easier closure because bowel continuity is maintained. However, incomplete fecal diversion may occur because stool can pass into the distal bowel, increasing the risk of distal contamination and urinary tract infection in patients with anorectal malformations. Prolapse and skin complications are also relatively common.[10,12]

Divided Colostomy
Divided colostomy involves complete transection of the colon with exteriorization of the proximal and distal bowel ends as two separate stomas. This technique provides complete fecal diversion and minimizes contamination of the distal bowel.Divided sigmoid colostomy is widely regarded as the preferred procedure for anorectal malformations because it reduces urinary contamination, facilitates distal loopograms, and lowers the risk of megarectum formation. Although technically more demanding than loop colostomy, it is associated with improved functional outcomes and fewer infectious complications.[3,10]

Double-Barrel Colostomy
In double-barrel colostomy, both proximal and distal ends of the transected colon are brought out through the abdominal wall adjacent to one another. The proximal stoma functions for fecal diversion, while the distal stoma permits mucus drainage and distal bowel irrigation.This technique allows easy access to the distal bowel and may be useful in selected

congenital anomalies. However, the presence of two stomas may complicate appliance fitting and increase skin care difficulties in infants.[1,3,10]

End Colostomy
End colostomy is formed by exteriorizing only the proximal bowel end, while the distal segment is either closed internally (Hartmann procedure) or removed. This type is less commonly used in infants but may be indicated in severe bowel necrosis, perforation, or trauma.

Site-Based Classification
Colostomies may also be classified according to anatomical location:
- Ascending colostomy
- Transverse colostomy
- Descending colostomy
- Sigmoid colostomy

Among these, sigmoid colostomy is preferred in most infants because stool consistency is more formed, fluid losses are reduced, and stoma care is easier compared with more proximal stomas.[1,3]

Selection of Colostomy Type
The choice of colostomy depends on:
- Underlying pathology
- Degree of bowel dilatation
- Presence of sepsis or perforation
- Need for distal bowel evaluation
- Nutritional status of the infant
- Surgeon experience and institutional practice

An ideal infant colostomy should provide adequate fecal diversion, minimize complications, preserve bowel length, and facilitate subsequent definitive surgical repair and stoma closure.

Postoperative Management and Stoma Care
Effective postoperative management is essential for reducing morbidity and improving outcomes in infants undergoing colostomy formation. Neonates and infants are particularly vulnerable to complications because of immature physiology, limited nutritional reserves, delicate skin, and dependence on caregivers for stoma care. Therefore, meticulous postoperative monitoring and multidisciplinary management are crucial.[14]

Immediate Postoperative Care
Following colostomy formation, infants should be closely monitored for hemodynamic stability, respiratory function, urine output, abdominal distension, and stoma viability. The stoma should appear pink or red and moist, indicating adequate vascular supply. Dark discoloration, pallor, or ischemic changes may suggest compromised perfusion requiring urgent surgical evaluation.
Nasogastric decompression may be necessary in the immediate postoperative period until bowel function returns. Intravenous fluids and electrolyte management are important, especially in neonates with high-output stomas or associated sepsis. Early initiation of enteral feeding is encouraged once bowel activity resumes, as this supports intestinal adaptation, growth, and immune function.Pain control should be carefully managed using neonatal analgesic protocols while minimizing respiratory depression. Antibiotic therapy may be continued in patients with contamination, perforation, or systemic infection.[14]

Stoma Assessment and Care
Routine assessment of the stoma includes evaluation of:

- Color and vascularity
- Size and protrusion
- Output volume and consistency
- Peristomal skin condition
- Evidence of prolapse, retraction, or stenosis

Appropriate stoma appliances should be selected according to the infant's size and abdominal contour. Frequent appliance changes may be necessary because of liquid stool output and poor adherence on neonatal skin. The peristomal skin must be kept clean and dry to prevent dermatitis and excoriation.
Barrier creams, hydrocolloid dressings, and properly fitting ostomy bags help protect fragile skin from chemical irritation caused by stool exposure. Caregiver education is fundamental and should include:
- Stoma cleaning techniques
- Appliance application and removal
- Recognition of complications

- Monitoring of hydration and stool output
- Nutritional guidance

Specialized stoma nurses play an important role in parental counseling, appliance fitting, and long-term follow-up.

Nutritional Support
Adequate nutrition is critical for growth and wound healing. Breastfeeding should be encouraged whenever possible because it improves immunity and gastrointestinal adaptation. Infants with high-output stomas may require additional fluid, electrolyte, and caloric supplementation.

Monitoring should include:
- Weight gain
- Hydration status
- Serum electrolytes
- Acid–base balance
- Signs of malnutrition

Micronutrient deficiencies and growth failure may occur in infants with prolonged diversion or extensive bowel disease.[14]

Preparation for Stoma Closure
Before colostomy closure, evaluation of distal bowel anatomy and function is necessary. Distal colostography is commonly performed in anorectal malformations to delineate fistulous anatomy and guide definitive repair. The timing of stoma closure depends on the infant's nutritional status, resolution of sepsis, and completion of definitive surgical correction.
Comprehensive postoperative care and caregiver education significantly reduce stoma-related morbidity and improve quality of life in infants with colostomies.

Complications
Complications following infant colostomy are common and remain a major source of morbidity despite advances in surgical technique and neonatal care. Reported complication rates vary widely, ranging from approximately 20% to 70%, depending on patient population, type of stoma, and duration of follow-up.[6,7]

Early Complications
Stoma Ischemia and Necrosis
Compromised blood supply during bowel mobilization or excessive tension on the mesentery may result in ischemia or necrosis of the stoma. Mild ischemia may resolve conservatively, whereas full-thickness necrosis requires urgent surgical revision.[15]

Bleeding
Minor mucosal bleeding is common after surgery and usually resolves spontaneously. Significant hemorrhage may indicate mucosal trauma, coagulopathy, or technical error.[15]

Peristomal Skin Excoriation
Skin excoriation is one of the most frequent complications in infants because of continuous stool exposure and fragile neonatal skin. Improper appliance fitting and leakage contribute significantly to dermatitis and infection.[15]

Retraction
Stoma retraction occurs when the bowel retracts below the skin level, leading to leakage and difficulty in appliance application. Factors contributing to retraction include inadequate bowel mobilization and poor fixation.[15]

Wound Infection
Surgical site infections may occur because of fecal contamination, particularly in emergency procedures or septic infants.

Late Complications
Stoma Prolapse
Prolapse is among the most common long-term complications, especially in loop and transverse colostomies. Excessive bowel mobility, increased intra-abdominal pressure, and inadequate fascial fixation contribute to prolapse formation. Severe prolapse may require surgical correction.[13]

Stenosis
Stomal stenosis results from ischemia, fibrosis, or inadequate maturation and may cause obstruction and poor stoma function. Mild cases may respond to dilatation, whereas severe stenosis often necessitates revision surgery.[13]

Parastomal Hernia
Weakness of the abdominal wall surrounding the stoma can lead to herniation of abdominal contents. Although less common in infants than adults, parastomal hernia may complicate appliance fitting and increase the risk of obstruction.[13]

High-Output Stoma and Electrolyte Imbalance
Proximal stomas may produce excessive fluid losses, resulting in dehydration, electrolyte abnormalities, and failure to thrive. Neonates are particularly susceptible because of limited physiological reserves.[13]

Bowel Obstruction
Adhesions, volvulus, prolapse, or stomal stenosis may contribute to intestinal obstruction after colostomy formation or closure.[13]

Complications Following Stoma Closure
Closure-related complications include:

- Anastomotic leak
- Wound infection
- Adhesive intestinal obstruction
- Enterocutaneous fistula
- Anastomotic stricture

Although mortality associated with colostomy closure is low, postoperative morbidity remains clinically significant.

Careful operative technique, proper stoma placement, meticulous postoperative care, and parental education are essential to minimize complications and improve outcomes.[7]

Outcomes and Prognosis
The prognosis following infant colostomy depends largely on the underlying disease, gestational age, nutritional status, associated congenital anomalies, and occurrence of postoperative complications. Advances in neonatal intensive care, anesthesia, nutritional support, and pediatric surgical techniques have significantly improved survival and long-term outcomes over recent decades. Most infants undergoing colostomy for anorectal malformations or Hirschsprung disease eventually achieve satisfactory bowel continuity following definitive reconstructive surgery and stoma closure. Divided sigmoid colostomy has been associated with lower complication rates and improved distal bowel management compared with transverse or loop colostomies. Growth and nutritional recovery are generally favorable when complications are minimized and enteral nutrition is established early. However, prolonged diversion, recurrent sepsis, and high-output stomas may contribute to growth retardation and delayed developmental progress.In infants with necrotizing enterocolitis, prognosis depends on the extent of bowel involvement and associated prematurity. Severe disease may result in intestinal failure, short bowel syndrome, or prolonged dependence on parenteral nutrition. Recent evidence suggests that selected neonates undergoing primary anastomosis may have outcomes comparable to or better than stoma formation in NEC management. Long-term bowel function after stoma closure varies according to the underlying pathology. Children with anorectal malformations may experience constipation, fecal incontinence, or soiling despite technically successful repair. Similarly, patients with Hirschsprung disease may develop enterocolitis, obstructive symptoms, or motility disorders during follow-up. Psychosocial outcomes are also important. The presence of a stoma can impose emotional and financial burdens on caregivers because of frequent appliance changes, skin care challenges, and repeated hospital visits. Comprehensive parental counseling and multidisciplinary support contribute substantially to improved quality of life and long-term adaptation. Overall, with appropriate surgical planning, meticulous stoma care, and timely definitive management, the majority of infants undergoing colostomy can achieve favorable clinical and functional outcomes.[14]

Current Controversies and Recent Advances
Several controversies remain regarding the optimal management of infant colostomy, particularly concerning the necessity of diversion, choice of colostomy type, timing of closure, and minimally invasive approaches.

Primary Repair versus Staged Diversion
One major controversy involves whether primary definitive repair should replace staged procedures with preliminary colostomy in selected conditions such as anorectal malformations and Hirschsprung disease. Improvements in neonatal anesthesia, laparoscopy, and perioperative care have enabled primary pull-through procedures in carefully selected neonates, potentially avoiding stoma-related morbidity. However, staged diversion remains preferred in unstable infants, delayed presentations, severe sepsis, or complex anomalies.[8,9]

Loop versus Divided Colostomy
Debate also continues regarding loop versus divided colostomy for anorectal malformations. Loop colostomies are technically simpler and easier to close, whereas divided colostomies provide better fecal diversion and reduced distal contamination. Recent systematic reviews suggest lower complication rates with divided sigmoid colostomy, although definitive consensus is still evolving.[10,12]

Timing of Stoma Closure
The ideal timing of stoma closure remains controversial. Early closure may reduce fluid loss, skin complications, and caregiver burden, whereas delayed closure allows nutritional recovery and reduction of postoperative adhesions. Current evidence has not demonstrated a clear superiority of early or late closure strategies.[8,9]

Minimally Invasive and Umbilical Approaches
Recent advances include laparoscopic-assisted colostomy creation, which may improve visualization and reduce surgical trauma. Studies have reported comparable or slightly improved complication profiles compared with conventional open techniques. Umbilical stoma placement has also emerged as a cosmetically favorable alternative in selected neonates with anorectal malformations.[10]

Advances in Stoma Care
Modern neonatal ostomy appliances, hydrocolloid barriers, and specialized pediatric stoma nursing have improved peristomal skin protection and caregiver confidence. Enhanced recovery protocols, improved nutritional strategies, and multidisciplinary follow-up have further contributed to better postoperative outcomes.

Future research is expected to focus on individualized surgical decision-making, minimally invasive techniques, optimization of timing for diversion and closure, and reduction of long-term functional complications.[5]

Table 1. Major Indications for Infant Colostomy

Indication	Pathophysiology / Clinical Context	Purpose of Colostomy	Preferred Type/Site	Key References
Anorectal malformations (ARM)	Abnormal hindgut and cloacal development causing distal obstruction or fistula	Fecal diversion, prevention of urinary contamination, decompression before definitive repair	Divided sigmoid colostomy	(3,4,10)
Hirschsprung disease	Congenital aganglionosis causing functional bowel obstruction	Bowel decompression, treatment of enterocolitis, nutritional optimization before pull-through	Leveling colostomy proximal to transition zone	(4,10)
Necrotizing enterocolitis (NEC)	Intestinal inflammation, ischemia, perforation in premature infants	Diversion in perforation, gangrene, or unstable bowel	Enterostomy or colostomy depending on bowel involvement	(7,8)
Meconium disorders	Meconium ileus, plug syndrome, or small left colon syndrome causing obstruction	Decompression and irrigation when conservative treatment fails	Temporary proximal diversion	(4,7)
Intestinal perforation and sepsis	Spontaneous or secondary perforation with peritoneal contamination	Sepsis control and fecal diversion	End or divided colostomy	(7,8)
Colonic/rectal trauma	Traumatic or iatrogenic bowel injury	Protection of repair and reduction of contamination	Diversion colostomy	(1,4)
Cloacal malformations	Complex anorectal and genitourinary anomalies	Diversion before staged reconstruction	Divided sigmoid colostomy	(4,10)
Colonic atresia	Congenital interruption of bowel continuity	Temporary decompression before definitive repair	Site-specific diversion	(4)
Protection of distal anastomosis	High-risk colorectal repair	Prevention of anastomotic leak	Loop or divided colostomy	(1,3)

Table 2. Types of Colostomy in Infants

Type of Colostomy	Surgical Technique	Advantages	Disadvantages	Common Indications
Loop colostomy	Exteriorization of bowel loop opened anteriorly	Technically simple, rapid creation, easier closure	Incomplete diversion, prolapse, distal contamination	Emergency diversion, unstable infants
Divided colostomy	Complete bowel transection with separate proximal/distal stomas	Complete fecal diversion, reduced distal contamination	More technically demanding	ARM, Hirschsprung disease
Double-barrel colostomy	Both bowel ends exteriorized adjacent to each other	Distal bowel access, mucus drainage	Difficult appliance fitting, skin complications	Selected congenital anomalies
End colostomy	Exteriorization of proximal bowel only	Effective diversion in severe disease	Requires later reconstruction	Perforation, necrosis, trauma

Table 3. Site-Based Classification of Infant Colostomy

ite	Characteristics	Advantages	Disadvantage
Ascending colostomy	Proximal colonic diversion	Useful in extensive distal disease	High fluid and electrolyte loss
Transverse colostomy	Mid-colon diversion	Easy accessibility	Higher prolapse rate
Descending colostomy	Distal diversion	Reduced fluid loss	Less commonly used
Sigmoid colostomy	Distal sigmoid diversion	Formed stool, easier care, lower complication rate	Requires adequate sigmoid mobility

Table 4. Early Complications of Infant Colostomy

Complication	Mechanism	Clinical Features	Management
Stoma ischemia/necrosis	Compromised vascular supply or mesenteric tension	Dark discoloration, nonviable stoma	Observation for mild ischemia; revision for necrosis
Bleeding	Mucosal trauma or technical error	Blood from stoma	Usually conservative; surgery if severe
Peristomal skin excoriation	Stool leakage and skin irritation	Dermatitis, erythema, ulceration	Barrier creams, proper appliance fitting
Retraction	Inadequate mobilization or fixation	Stoma below skin level	Appliance adjustment or revision
Wound infection	Fecal contamination	Erythema, discharge, fever	Antibiotics and wound care

Table 5. Late Complications of Infant Colostomy

Complication	Risk Factors	Clinical Consequences	Management
Stoma prolapse	Loop/transverse stoma, weak fixation	Difficult appliance fitting, edema	Conservative or surgical revision

Stenosis	Ischemia, fibrosis	Obstruction, poor output	Dilatation or revision
Parastomal hernia	Weak abdominal wall	Bulge, obstruction risk	Observation or repair
High-output stoma	Proximal diversion	Dehydration, electrolyte imbalance	Fluid/electrolyte replacement
Bowel obstruction	Adhesions, volvulus, stenosis	Distension, vomiting	Surgical intervention if severe

Table 6. Complications Following Colostomy Closure

Complication	Clinical Presentation	Management
Anastomotic leak	Fever, sepsis, abdominal distension	Antibiotics, drainage, possible reoperation
Wound infection	Erythema, purulent discharge	Antibiotics and local wound care
Adhesive bowel obstruction	Vomiting, distension	Conservative or surgical treatment
Enterocutaneous fistula	Persistent fecal drainage	Nutritional support and surgery if persistent
Anastomotic stricture	Obstructive symptoms	Dilatation or revision

Table 7. Postoperative Management and Stoma Care

Aspect	Key Components
Immediate postoperative monitoring	Hemodynamic status, stoma viability, urine output, abdominal distension
Nutritional management	Early enteral feeding, breastfeeding encouragement, electrolyte monitoring
Stoma assessment	Color, vascularity, protrusion, output, skin integrity
Skin protection	Barrier creams, hydrocolloid dressings, proper appliance fitting
Caregiver education	Cleaning techniques, appliance changes, complication recognition
Multidisciplinary support	Pediatric surgeons, neonatologists, stoma nurses, nutritionists

Table 8. Factors Influencing Choice of Colostomy

Factor	Influence on Surgical Decision
Underlying pathology	Determines need for temporary vs definitive diversion
Presence of sepsis/perforation	Favors rapid and reliable diversion
Degree of bowel dilatation	Influences stoma site and bowel selection
Need for distal bowel evaluation	Divided stoma facilitates distal studies
Nutritional status	May affect timing and complexity of surgery
Surgeon experience	Influences preference for technique
Institutional resources	Availability of neonatal intensive care and stoma support

Table 9. Current Controversies and Recent Advances

Topic	Current Evidence/Controversy
Primary repair vs staged diversion	Primary repair increasingly feasible in selected neonates; staged diversion still preferred in unstable or complex cases

Loop vs divided colostomy	Divided sigmoid colostomy associated with lower contamination and complication rates
Timing of stoma closure	No clear superiority of early versus delayed closure
Minimally invasive surgery	Laparoscopic-assisted colostomy may reduce surgical trauma
Umbilical stoma placement	Improved cosmetic outcomes in selected neonates
Modern stoma care	Improved appliances and specialized nursing reduce skin complications

Table 10. Prognostic Factors Affecting Outcomes

Prognostic Factor	Effect on Outcome
Underlying disease severity	Major determinant of survival and bowel function
Prematurity and low birth weight	Increased morbidity and mortality
Nutritional status	Influences wound healing and growth
Presence of sepsis	Associated with poorer outcomes
Type of colostomy	Divided sigmoid colostomy generally associated with fewer complications
Duration of diversion	Prolonged diversion may impair growth
Postoperative complications	Increase hospital stay and need for revision surgery

Table 11. Key Take-Home Messages

Topic	Summary
Most common indication	Anorectal malformation
Preferred colostomy for ARM	Divided sigmoid colostomy
Most frequent complication	Peristomal skin excoriation and prolapse
Major postoperative priorities	Nutrition, hydration, skin care, caregiver education
Important advances	Minimally invasive surgery, improved stoma appliances
Long-term goal	Safe definitive reconstruction with preservation of bowel function

CONCLUSION

Infant colostomy remains an essential component of neonatal and pediatric surgical practice despite significant advances in definitive corrective procedures and minimally invasive surgery. The procedure plays a vital role in the management of congenital and acquired gastrointestinal disorders such as anorectal malformations, Hirschsprung disease, necrotizing enterocolitis, intestinal perforation, and traumatic bowel injuries.[1,5] Successful outcomes depend on careful patient selection, thorough understanding of embryology and surgical anatomy, appropriate choice of colostomy type, meticulous operative technique, and comprehensive postoperative care. Although colostomy can be lifesaving, it is associated with substantial morbidity including prolapse, skin excoriation, stenosis, retraction, and electrolyte imbalance. Early recognition and management of complications are therefore critical.

Recent advances in neonatal intensive care, laparoscopic surgery, stoma appliances, and multidisciplinary management have improved survival and quality of life for affected infants. Nevertheless, controversies persist regarding the optimal type of colostomy, timing of closure, and role of primary definitive repair without diversion in selected cases. Further prospective studies and standardized protocols are needed to optimize surgical decision-making, minimize complications, and improve long-term functional outcomes in infants undergoing colostomy formation.

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