Hirschsprung's disease/ Aganglionic megacolon

Hirschsprung’s disease is a congenital condition characterized by the absence of ganglion cells in the submucosal (Meissner’s) and myenteric (Auerbach’s) plexuses of the distal bowel. This results in functional intestinal obstruction due to a lack of peristalsis in the affected segment.

Epidemiology

- Incidence: ~1 in 5,000 live births.
- **Sex**: 4:1 male-to-female ratio in short-segment disease. Long-segment disease is more common in females.
- **Ethnicity**: More prevalent in Caucasians than in Black or Asian populations.
- Familial cases: 5–10%; more likely in females and with longer aganglionic segments.

Etiology & Genetics

Hirschsprung's disease can be **sporadic (80–90%)** or **familial (10–20%)**. It results from defective migration or differentiation of neural crest cells during embryogenesis.

Genetic Associations

Gene	Chromosome	Inheritance
RET	10q11.2	Autosomal dominant (incomplete penetrance)
EDNRB	13q22	Autosomal recessive
EDN3	20q13	Autosomal recessive

Inheritance pattern:

- Long-segment: Often autosomal dominant.
- Short-segment: Typically autosomal recessive.

Pathophysiology

- **Primary defect**: Failure of neural crest cell migration into the distal gastrointestinal tract.
- **Result**: Absence of parasympathetic ganglion cells ? loss of coordinated peristalsis ? functional obstruction.
- **Transition zone**: Normal proximal bowel becomes dilated due to fecal stasis; distal aganglionic bowel is narrowed and contracted.

Associated Conditions

- **Trisomy 21 (Down syndrome)** – ~10% of affected children have Down syndrome.

- **Waardenburg syndrome**
- **Congenital central hypoventilation syndrome (Ondine's curse)**
- **Anorectal malformations**
- **Genitourinary anomalies**

Clinical Features

Neonatal Period

- Delayed passage of meconium >48 hours
- Abdominal distension
- Bilious vomiting
- Poor feeding

Infancy & Childhood

- Chronic constipation alternating with diarrhea
- Small, ribbon-like stools
- Visible peristalsis
- Failure to thrive
- Explosive expulsion of stool after rectal exam (“squirt sign”)

Complications

- Hirschsprung-associated enterocolitis (HAEC): potentially fatal, presents with fever, abdominal distension, and bloody diarrhea.
- Toxic megacolon
- Intestinal perforation
- Failure to thrive

Physical Examination

- Abdominal distension
- Palpable fecal masses
- Tight, empty rectum on digital rectal exam
- Squirt sign: explosive release of gas/stool after digital rectal stimulation

Diagnosis

Imaging

1. **Abdominal X-ray**
    - Dilated loops of bowel
    - Air-fluid levels
    - Lack of gas in the rectum
2. **Contrast Enema (Barium enema)**
    - Reveals a narrow aganglionic distal segment with proximal megacolon
    - Transition zone is diagnostic

3. **Anorectal Manometry**
    - Absent rectoanal inhibitory reflex (RAIR)

Biopsy (Gold Standard)

- **Rectal suction biopsy**:
    - No ganglion cells
    - Hypertrophic nerve trunks
    - Positive acetylcholinesterase staining
- **Full-thickness biopsy** (if suction biopsy inconclusive)

Differential Diagnosis

- Meconium plug syndrome
- Small left colon syndrome
- Anorectal malformations
- Intestinal atresia
- Sepsis
- Hypothyroidism
- Pseudo-obstruction

Management

Initial Stabilization

- IV fluids, electrolyte correction
- Rectal decompression with saline enemas
- Broad-spectrum antibiotics for suspected enterocolitis

Definitive Surgical Treatment

Goals

- Resect aganglionic segment
- Restore bowel continuity with functional ganglionic bowel

Surgical Techniques

1. **Swenson Procedure**
    - End-to-end anastomosis after resecting aganglionic rectum and colon.
2. **Duhamel Procedure**
    - Retrorectal pull-through with side-to-side anastomosis between ganglionic bowel and rectal stump.
3. **Soave Procedure**
    - Pull-through of ganglionic mucosa through the muscular cuff of the rectum (submucosal endorectal dissection).

Staged vs. Single-stage repair

- **Staged** (especially in sick neonates): Initial colostomy followed by pull-through.
- **Single-stage**: Definitive surgery without prior stoma, increasingly common in stable patients.

Prognosis

- Excellent with early diagnosis and surgical correction.
- Long-term complications:
    - Persistent constipation or soiling
    - Enterocolitis (may recur post-op)
    - Fecal incontinence (rare, more common in long-segment disease)

High-Yield

Feature	Hirschsprung’s Disease
Cause	Congenital absence of ganglion cells
Main Symptom	Failure to pass meconium in first 48 hours
Diagnosis	Rectal suction biopsy (gold standard)
Imaging	Barium enema ? transition zone
Reflex Absent	Rectoanal inhibitory reflex
Associated Syndromes	Down syndrome, Waardenburg, Ondine’s curse
Management	Surgical resection and pull-through