

BICKHAM-CALLANDER

Surgery of The Alimentary Tract

VOLUME THREE

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Contents

VOLUME THREE

Chapter 10

THE ANORECTAL TRACT.....	1635
EMBRYOLOGY.....	1635
ANATOMY.....	1635
PHYSIOLOGY.....	1667
FIELD BLOCK ANALGESIA OF THE PERIANAL AND ANORECTAL REGIONS.....	1668
PROCTOSCOPY.....	1669
CONGENITAL ANORECTAL MALFORMATIONS.....	1680
Type 1 Anorectal Malformation (Stenosis at or Just above the Anus)	1684
Type 2 Anorectal Malformation (Imperforate Anus).....	1685
Operation for Correction of Diaphragm Occlusion.....	1687
Operation for Correction of Partial Occlusion by Fibrous Bands.....	1687
Type 3 Anorectal Malformation (High Rectal Pouch with Proctodeal Invagination).....	1687
Perineal Repair.....	1689
Stone Method of Perineal Repair.....	1693
Rizzoli's Method of Perineal Repair.....	1696
One-Stage Abdominoperineal Replacement of the Rectum..	1697
Type 4 Anorectal Malformation (Normal Lower Rectum with Upper Rectum Ending in Blind Pouch).....	1701
Abnormal Location of the Anus.....	1702
Congenital Absence of the Rectum.....	1702
Results of Surgical Treatment of Congenital Anorectal Malformations.....	1702
SACROCOCCYGEAL TUMORS, CYSTS AND SINUSES.....	1703
Sacrococcygeal (Pilonidal) Cysts and Sinuses.....	1703
Excision with Primary Closure.....	1707
Excision with Partial Primary Closure.....	1721
Excision, Wound Left Open for Early Secondary Closure...	1723
Excision, Wound Left Open to Heal by Granulation.....	1723
Marsupialization.....	1724
Comments on Pilonidal Surgery.....	1728

CONTENTS OF VOLUME THREE

Sacrococcygeal Chordoma.....	1728
Surgical Treatment.....	1733
Sacrococcygeal Teratomas.....	1738
Excision of Tumor.....	1740
Sacrococcygeal Meningocele and Meningomyelocele.....	1745
Other Sacrococcygeal Tumors, Cysts and Sinuses.....	1746
COCCYDYNIA (COCCYGODYNIA, COCCYALGIA).....	1746
COCCYGECTOMY.....	1747
PRURITUS ANI.....	1749
Injection Treatment for Idiopathic Pruritus Ani.....	1751
Stone (Multiple Puncture) Method of Alcohol Injection....	1752
Segmental Alcohol Injection.....	1753
Single Puncture Alcohol Injection (Buie).....	1754
Complications of Injection Treatment for Pruritus Ani....	1755
Comments on Injection Treatment for Pruritus Ani.....	1756
Tattooing with Mercury Sulfide.....	1756
Electrodesiccation.....	1757
Roentgenotherapy.....	1758
Excision of Pruritic Area.....	1758
Subcutaneous Division of Sensory Nerves.....	1760
Conclusions.....	1762
HEMORRHOIDS.....	1762
Palliative Surgery.....	1767
Incision and Evacuation of the Clot.....	1767
Local Excision.....	1768
Simple Ligation without Excision.....	1769
Comments on Palliative Procedures.....	1769
Hemorrhoidectomy.....	1770
Ligation, Excision and Suture Closure.....	1774
Clamp, Excision and Suture Method (Bacon).....	1782
Simple Ligation with Local Excision.....	1784
Ball Method.....	1785
Clamp and Cautery Method.....	1786
Circular Amputation (Whitehead).....	1788
Amputation and Plastic Repair (Buie).....	1789
Postoperative Complications of Hemorrhoidectomy.....	1792
Comments on Hemorrhoidectomy.....	1794
Injection Treatment.....	1794
Electrical Treatment.....	1796
ANAL CRYPTITIS AND HYPERTROPHIED PAPILLAE OF MORGAGNI.....	1796
PECTENOSIS.....	1799
FISSURE IN ANO.....	1799
Excision of Anal Fissure.....	1802
Excision Followed by Partial Suture.....	1804
Sphincterotomy.....	1804
Forceful Dilatation.....	1805
Injection Methods.....	1805
Cauterization.....	1805
Comments on Treatment of Anal Fissure.....	1805

CONTENTS OF VOLUME THREE

ANORECTAL ABSCESSES.....	1805
Cutaneous Abscess (Intralevator).....	1809
Subcutaneous Abscess (Infralevator).....	1809
Incision and Drainage.....	1810
Perianal Pyoderma (Hidradenitis).....	1811
Total Excision Followed by Skin Grafting.....	1811
Wide Incision of All Sinus Tracts.....	1813
Ischioanal (Ischiorectal) Abscess (Infralevator).....	1813
Incision and Drainage.....	1814
Mural, Interstitial or Submucous (Supralevator) Abscess.....	1816
Incision and Drainage.....	1816
Pelvirectal Abscess (Supralevator).....	1817
External Drainage.....	1818
Internal Drainage.....	1819
Retrorectal Abscess (Supralevator).....	1820
External Drainage.....	1820
Internal Drainage.....	1820
Comments on Anorectal Abscesses.....	1820
PELVIC INTRAPERITONEAL ABSCESS.....	1821
ANORECTAL FISTULAS.....	1822
Fistulotomy and Fistulectomy.....	1825
For Simple Fistula.....	1827
For Complex Fistulas.....	1832
Postoperative Complications.....	1835
Ligature or Seton Technic.....	1836
Curettage with or without Closure of One End of Suture.....	1837
Excision Followed by Suture.....	1837
Operation for Complete Internal Anorectal Fistula.....	1839
Blind Anorectal Fistula (Sinus).....	1839
Carcinoma in Fistula in Ano.....	1840
Tuberculous Fistulas.....	1841
Congenital Fistulas of the Anorectal Tract.....	1842
Anorectal Fistulas Communicating with Some Other Viscus.....	1842
Anovaginal Fistula.....	1843
Rectovaginal Fistula.....	1843
Rectourethral Fistula.....	1851
Rectovesical Fistula.....	1862
Rectoureteral Fistula.....	1865
ANAL INCONTINENCE.....	1865
Sphincter Repair Operations.....	1867
Excision of Scar and Wire Pull-out Suture of the Cut Ends (Birnbaum).....	1867
Transverse Excision of Area of Scarred Sphincter, Followed by End-to-End Suturing of Sphincter.....	1869
Heineke-Mikulicz Type Repair of Anal Sphincter (Tait)....	1870
Two-Stage Repair of Sphincter Muscle (Blaisdell).....	1871
Repair of Congenital Incomplete Sphincter with Fascia (Hart).....	1872
Perineorrhaphy.....	1872
Comments on Operations to Repair the Sphincter.....	1877

CONTENTS OF VOLUME THREE

Sphincter Pleating Operations.....	1877
Intravaginal Reefing of Anal Sphincter.....	1877
Posterior Reefing of Anal Sphincter (Lockhart-Mummery)...	1878
Plication of the Sphincter (Nesselrod).....	1880
Sphincter Replacement Operations.....	1881
Replacement with Fascial Slings (Wreden-Stone).....	1881
Replacement with Gluteus Maximus Sling (Chittenden)....	1884
Replacement with Gracilis Muscle Sling (Pickrell).....	1885
Replacement by Encircling Wire (Thiersch).....	1888
Linear Cauterization for Anal Incontinence.....	1890
BENIGN ANORECTAL STENOSIS AND STRICTURE.....	1890
Stenosis or Stricture Due to Congenital Malformations.....	1891
Inflammatory Anorectal Strictures.....	1891
Stricture Due to Lymphogranuloma Venereum.....	1891
Stricture Due to Spasm of Sphincter Ani.....	1892
Stenosis Due to Benign Tumor.....	1893
Traumatic Stricture.....	1893
Surgical Treatment.....	1894
Internal Sphincterotomy, Proctotomy or Stricturotomy with Dilation.....	1894
Anoplasty (Martin).....	1895
Tunnel Graft (Keller).....	1897
Proctoplasty for Superficial Anal Stricture (Dieffenbach)....	1899
Longitudinal Incision with Transverse Closure of Rectal Stricture (Lockhart-Mummery and Lloyd-Davies).....	1899
Excision of the Strictured Portion of the Rectum.....	1900
Resection of Rectum with Transanal Anastomosis for Post- irradiation Rectal Stricture and Rectovaginal Fistula (Brintnall).....	1900
Other Operations for Anorectal Stricture.....	1904
PROLAPSE AND PROCIDENTIA.....	1904
Prolapse of Rectal Mucosa (Partial Prolapse of Rectum).....	1905
Treatment by Injection.....	1908
Linear Cauterization (Van Buren).....	1908
Stone Type of Hemorrhoidectomy (Excision Followed by Suture).....	1909
Whitehead (Amputation Type) Hemorrhoidectomy.....	1910
Clamp and Cautery (Smith) Hemorrhoidectomy.....	1910
Elliptic Excision with Longitudinal Suturing (Duret).....	1910
Longitudinal Excision with Transverse Suturing (Bacon)....	1910
Excision of Mucosa Followed by Suturing (Rehn-Delorme). 1913	
David's Modification of Rehn-Delorme Operation.....	1915
Tightening the Anal Ring.....	1915
Injection Treatment and Linear Cauterization.....	1917
Procidentia (Prolapse of the Rectum).....	1917
Two-Stage Combined Abdominoperineal Operation for Complete Prolapse of the Rectum (Procidentia).....	1920
One-Stage Abdominal Resection of Sigmoid with Perineal Excision of Prolapsed Mucosa (Stone).....	1925
Two-Stage Abdominal Operation (Skinner and Duncan)....	1926

CONTENTS OF VOLUME THREE

One-Stage Abdominal Operation with Resection of Sigmoid (Stabins).....	1926
Two-Stage Combined Abdominoperineal Operation (Dunphy).....	1926
Obliteration of Peritoneal Cul-de-Sac (Moschowitz).....	1932
Excision of Peritoneal Sac (Graham).....	1934
Fascial Suspension of Rectum (Orr).....	1935
Fascial Repair of Perineal Hernia (C. W. Mayo).....	1937
Mobilization with Fixation (Pemberton).....	1939
Bowel Shortening and Fixation (Mikulicz-Bloch).....	1940
Transabdominal Sigmoidopexy, Shortening of Lateral Ligaments, Uterine Suspension and Obliteration of Cul-de-Sac (Bacon).....	1942
One-Stage Abdominoperineal Repair (Brintnall).....	1945
Colopexy by Shortening of Mesosigmoid (Hirschman)....	1946
Fixation to Psoas Muscle (Martin).....	1947
Shortening Lateral Ligaments of Rectum (Lynch).....	1948
Rectosigmoidectomy (Miles).....	1949
Perineal Resection (Mikulicz).....	1952
Perineal Excision (Cunningham).....	1954
Perineal Proctosigmoidectomy (Babcock-Bacon).....	1956
Perineal Amputation of First-Degree Complete Prolapse (Buie).....	1957
Longitudinal and Transverse Rectorrhaphy and Rectopexy (Lange-Verneuil).....	1959
Rectopexy by Sacral Suspension (Tuttle).....	1959
Rectoplasty by Longitudinal Incision and Transverse Suturing (Gant).....	1961
Adhesion-Producing Operation by Tamponading with Gauze (Ritter).....	1961
Perineal Plastic Repair of Levators and Plication of Anterior Rectal Wall.....	1961
Amputation of Prolapse by Ligature (Kleberg-Reid).....	1962
Evaluation of the Methods of Treating Prolapse and Procidentia..	1964
WOUNDS OF THE ANORECTAL TRACT.....	1965
FOREIGN BODIES WITHIN THE RECTUM.....	1968
FECAL IMPACTION.....	1969
REFERENCES.....	1970

Chapter 11

EXCISIONS OF THE RECTUM.....	1975
TUMORS OF THE ANORECTAL TRACT.....	1975
Benign Anorectal Tumors.....	1976
Papilloma of the Anus.....	1976
Fibroma.....	1978
Lipoma.....	1979
Myoma.....	1979
Neuroma and Neurofibroma.....	1980

CONTENTS OF VOLUME THREE

Angioma.....	1980
Oleomas (Eleomas).....	1980
Adenoma.....	1981
Precancerous Rectal Tumors.....	1981
Bowen's Disease.....	1981
Kraurosis.....	1981
Leukoplakia.....	1981
Rectal Polyps.....	1984
Fulguration (Electrodesiccation) for Treatment of Rectal Polyps...	1989
Operations upon the Interior of the Rectum.....	1993
Operations through the Anus.....	1993
Posterior (Dorsal) Rectotomy.....	1994
Anterior Rectotomy.....	1997
Malignant Tumors of the Anorectal Tract.....	1997
Carcinoma of the Anorectal Tract.....	1998
Sarcoma of the Anorectal Tract.....	2011
PARTIAL AND COMPLETE EXCISIONS OF THE ANO-RECTOSIGMOID TRACT.....	2013
Approaches for Partial or Complete Excision of the Rectum.....	2015
Choices between an Abdominal and a Perineal Artificial Anus	2016
Choice of Specific Operations.....	2016
Excisions of the Rectum Requiring Permanent Abdominal Colos-	
tomy.....	2018
One-Stage Abdominoperineal Complete Excision of the	
Rectum with Permanent Single-Barrelled Colostomy	
(Miles).....	2018
Radical Abdominoperineal Excision of Anorectal Tract with	
Abdominal Colostomy (Sauer-Bacon).....	2031
One-Stage Combined Abdominoperineal Complete Excision	
of the Rectum with Permanent Single-Barrelled	
Colostomy (State).....	2036
Synchronous Combined Abdominoperineal Total Excision	
of the Rectum (Lloyd-Davies).....	2038
Two-Stage Abdominoperineal Complete Excision of Rectum	
with Permanent Single-Barrelled Colostomy (Lahey)...	2042
One-Stage Perineoabdominal Complete Excision of the	
Rectum with Permanent Colostomy (Gabriel).....	2047
Two-Stage Combined Perineoabdominal Total Excision of	
the Rectum (Gabriel).....	2051
Results with One- or Two-Stage Combined Perineoabdom-	
inal Total Excision of the Rectum (Gabriel).....	2051
Two-Stage Abdominoperineal (Perineal) Complete Excision	
of the Rectum with Double-Barrelled Colostomy (Lock-	
hart-Mummery).....	2053
One-Stage Abdominal Partial Excision of the Upper Rectum	
with a Single-Barrelled Colostomy (Hartmann).....	2064
Two-Stage Abdominoperineal Excision of the Rectum	
(Jones).....	2066
Multiple-Stage Perineoabdominal Complete Excision of the	
Rectum with Permanent Single-Barrelled Colostomy	
(Rankin).....	2068

CONTENTS OF VOLUME THREE

Sphincter-Preserving Operations for Excising the Rectum.....	2071
One-Stage Abdominal (Anterior) Partial Excision of the Rectum with an Open End-to-End Anastomosis (Dixon).	2075
One-Stage Abdominal Partial Excision of the Rectum with Anastomosis over a Tube (Lockhart-Mummery-Balfour).	2084
Perineal Partial Excision of Rectum with End-to-End Anastomosis and Preservation of the Sphincters (Kraske).	2086
One-Stage Perineal Partial Excision of Rectum with Preservation of Sphincters (Cunéo, Sénéque and Zagdoun)....	2089
Two-Stage Perineal Resection of Rectum with Preservation of Sphincters (Küttner).....	2090
One-Stage Perineal Partial Excision of Rectum with Preservation of Sphincters (Hochenegg).....	2090
One-Stage Abdominoperineal Partial Excision of Rectum with Preservation of Sphincters (Bickham).....	2093
Three-Stage Abdominosacral Partial Resection of Rectum with Preservation of the Sphincters (Kirschner).....	2093
One-Stage Abdominoperineal Partial Excision of Rectum with Perineal End-to-End Anastomosis.....	2095
Two-Stage Abdominoperineal and Perineal Partial Excision of Rectum with Restoration of Bowel Continuity (Arnold)	2097
One-Stage Abdominoperineal Proctosigmoidectomy without Colostomy (Babcock, Bacon).....	2101
One-Stage Perineal Proctosigmoidectomy with Colostomy (Kirschner).....	2111
Combined Endorectal Resection (Black).....	2112
Radical Abdominal Proctosigmoidectomy with Preservation of Anal Sphincter (Welch-Rheinlander).....	2117
Comments on Sphincter-Saving Operations.....	2124
Perineal Local Excision of the Rectum (Bevan).....	2126
Excisions of the Rectum Requiring a Perineal Colostomy or Fistula.	2127
One-Stage Perineal Complete Excision of the Rectum with Intentional Fistula Formation (Lynch).....	2127
One-Stage Perineal Complete Excision of Rectum with Perineal Colostomy.....	2127
Complications Following Rectal Excisions.....	2133
Urologic Complications.....	2133
Small Bowel Obstruction Following Resections of Anorectal Tract.....	2139
Perineal Fistula.....	2140
Comments on Excisions of the Anorectal Tract.....	2141
REFERENCES.....	2151

Chapter 12

HERNIA OF THE GASTROINTESTINAL TRACT.....	2155
HERNIA OF LINEA ALBA (EPIGASTRIC AND HYPOGASTRIC HERNIA).....	2163
Operative Treatment.....	2165
Intraperitoneal Method.....	2165

CONTENTS OF VOLUME THREE

Extraperitoneal Method.....	2166
Injection Treatment.....	2167
Mechanical Treatment.....	2168
DIASTASIS OF THE RECTI.....	2168
UMBILICAL HERNIA.....	2168
Congenital Umbilical Hernia.....	2168
Infantile Umbilical Hernia.....	2168
Mechanical Treatment.....	2170
Operative Treatment.....	2173
Adult Umbilical Hernia.....	2178
Mechanical Treatment.....	2179
Injection Treatment.....	2179
Operative Treatment.....	2180
Postoperative Care.....	2193
Results.....	2194
Comments on Umbilical Hernia.....	2194
VENTRAL AND INCISIONAL HERNIA.....	2194
Operative Treatment.....	2197
Technics of Closure.....	2199
Postoperative Care.....	2220
INGUINAL HERNIA.....	2221
Mechanical Treatment.....	2232
Injection Treatment.....	2235
Operative Treatment.....	2241
Operations for Indirect Inguinal Hernia in Older Children and Adults.....	2248
Halsted I Inguinal Hernioplasty.....	2251
Bassini Inguinal Hernioplasty.....	2255
Ferguson Inguinal Hernioplasty.....	2256
Andrews Inguinal Hernioplasty.....	2257
Ferguson-Andrews (Halsted II, "Hopkins") Inguinal Hernioplasty.....	2258
Rectus Fascia Inguinal Hernioplasty (Rienhoff).....	2260
Cooper's Ligament Inguinal Hernioplasty (Lotheissen, McVay and Anson).....	2260
Intra-abdominal Operation for Inguinal Hernia (LaRoque).....	2264
Inguinal Hernioplasty (Zimmerman).....	2265
Inguinal Hernioplasty (Warren).....	2268
External Oblique Hernioplasty (McArthur).....	2268
External Oblique Inguinal Hernioplasty (Joyce).....	2272
Fascial Patch Inguinal Hernioplasty (Singleton and Stehouwer).....	2274
Inguinal Hernioplasty in Females.....	2277
Bilateral Inguinal Hernioplasty.....	2278
Operations for Inguinal Hernia in Infants and Young Children.....	2280
Transverse Incision Operation.....	2281
Modified Ferguson Operation.....	2283
Simple Excision of the Sac (Kocher, Mitchell-Banks).....	2288
Operation for Incarcerated or Strangulated Inguinal Hernia in Children.....	2288

CONTENTS OF VOLUME THREE

Operations for Direct Inguinal Hernia.....	2290
Modified Halsted Inguinal Hernioplasty (Orr).....	2292
Cooper's Ligament Operation (McVay).....	2294
Modified Bassini Inguinal Hernioplasty.....	2294
Hernioplasty for Direct Inguinal Hernia Containing Bladder.....	2295
Inguinal Hernioplasty with Fascial Strips (Gallie).....	2299
Inguinal Hernioplasty with Tantalum Mesh (Koontz).....	2301
Direct Inguinal Hernioplasty (Zimmerman).....	2304
Operations for Sliding Inguinal Hernia.....	2307
Sliding Inguinal Hernioplasty by Intra-abdominal Approach (LaRoque).....	2310
Sliding Inguinal Hernioplasty by Extraperitoneal Approach.....	2318
Incarcerated or Strangulated Inguinal Hernioplasty.....	2319
Combined Direct and Indirect (Pantaloon) Inguinal Hernioplasty (Callander).....	2324
Combined Direct and Indirect (Pantaloon) Inguinal Hernioplasty (Hoguet).....	2326
Combined Right Inguinal Hernioplasty and Appendectomy (Thorek).....	2327
Inguinal Hernia Associated with Cryptorchism.....	2328
Combined Orchiopexy and Inguinal Hernioplasty (Gross)... ..	2329
Bevan Technic of Combined Orchiopexy and Inguinal Hernioplasty.....	2336
Two-Stage Combined Orchiopexy and Inguinal Hernioplasty (Thorek).....	2336
Results of Surgical Treatment.....	2336
Recurrent Inguinal Hernia.....	2339
FEMORAL HERNIA.....	2342
Femoral (Subinguinal) Hernioplasties.....	2351
Subinguinal Femoral Hernioplasty (Bassini).....	2353
Purse-String Subinguinal Femoral Hernioplasty.....	2353
Comments on Subinguinal Femoral Hernioplasty.....	2356
Femoral Suprainguinal (Inguinal) Hernioplasties.....	2356
Suprainguinal (Inguinal) Femoral Hernioplasty.....	2356
Cooper's Ligament Suprainguinal Femoral Hernioplasty (McVay).....	2360
Suprainguinal Femoral Hernioplasty Using External Oblique Fascia (Willys Andrews).....	2360
Suprainguinal Femoral Hernioplasty Using Patches of Various Materials.....	2360
Combined Inguino-femoral Intraperitoneal Femoral Hernioplasty (LaRoque).....	2360
Midline Abdominal Extraperitoneal Femoral Hernioplasty (Henry).....	2362
Richter's Femoral Hernioplasty.....	2363
LUMBAR HERNIA.....	2364
Lumbar Hernioplasty (Dowd).....	2366
OBTURATOR HERNIA.....	2369
Abdominal Obturator Hernioplasty.....	2373
Subinguinal Obturator Hernioplasty.....	2375

CONTENTS OF VOLUME THREE

Combined Abdominal and Subinguinal Obturator Hernioplasty...	2376
Inguinal Extraperitoneal Obturator Hernioplasty.....	2377
Comments on Obturator Hernioplasty.....	2377
SCIATIC HERNIA.....	2377
Abdominal Sciatic Hernioplasty.....	2382
Gluteal Sciatic Hernioplasty.....	2385
PERINEAL HERNIA.....	2385
Combined Abdominoperineal Perineal Hernioplasty (Chase).....	2390
Perineal Repair of Perineal Hernia.....	2394
Repair of Enterocele.....	2396
Perineal Repair of Enterocele.....	2396
Perineal Repair of Enterocele with Uterine Transposition (Hundley).....	2396
Abdominal Repair of Enterocele (Moschowitz).....	2397
DIAPHRAGMATIC HERNIA.....	2398
Diaphragmatic Hernias in Adults.....	2406
Transthoracic Repair of Sliding Hiatus Hernia (Allison)....	2410
Transthoracic Repair of Sliding Hiatus Hernia (Sweet)....	2415
Transthoracic Repair of Hiatus Hernia Due to Lack of Attachment of a Crus.....	2419
Transabdominal Repair of Sliding Hiatus Hernia (Har- rington).....	2419
Transthoracic Repair of Paraesophageal Hernia.....	2422
Transabdominal Repair of Paraesophageal Hernia.....	2423
Transthoracic Repair of Traumatic Diaphragmatic Hernia..	2424
Transabdominal Repair of Traumatic Diaphragmatic Hernia.....	2424
Repair of Parasternal (Retrosternal) Hernia.....	2429
Postoperative Care Following Diaphragmatic Hernio- plasties.....	2430
Results of Diaphragmatic Hernioplasties.....	2430
Congenital Diaphragmatic Hernias in Children.....	2431
Repair of Hernia of Foramen of Bochdalek (Pleuroperitoneal Canal).....	2433
Repair of Congenital Hiatus Hernia.....	2436
Results of Treatment of Diaphragmatic Hernia in Children..	2438
REFERENCES.....	2439

Chapter 13

INCISIONS.....	2443
EXPOSURE OF CERVICAL PORTION OF ALIMENTARY TRACT.....	2443
Anatomy.....	2443
Approaches to the Cervical Esophagus.....	2456
EXPOSURE OF THORACIC PORTION OF ALIMENTARY CANAL.....	2462
Anatomy.....	2462
Approaches to the Thoracic Esophagus.....	2484

CONTENTS OF VOLUME THREE

Minor Thoracotomy Incisions.....	2484
Major Thoracotomy Incisions.....	2487
Standard (Posterolateral) Thoracotomy Incision.....	2487
Anterolateral Thoracotomy Incision.....	2493
Posterior Extrapleural Thoracotomy Incision.....	2495
THORACICOABDOMINAL (ABDOMINOTHORACIC) INCISION (CARTER).....	2496
ABDOMINAL INCISIONS.....	2499
Anatomy.....	2499
Types and Choice of Incision.....	2522
Upper Midline Incision.....	2525
Lower Midline Incision.....	2538
Paramedian Incision.....	2540
Midrectus (Transrectus) Incision.....	2543
Pararectus Incision (Kammerer-Battle).....	2545
Transverse Abdominal Incisions.....	2547
Upper Abdominal Transverse Incision.....	2547
Modified Upper Abdominal Transversus Incision by Retracting Instead of Severing the Rectus Muscle (Sanders)....	2550
Lateral Upper Abdominal Transverse Incision (Singleton)..	2550
Transverse Midabdominal Incision.....	2552
Transverse Low Abdominal Incision.....	2554
Pfannenstiel Incision.....	2554
Left Transverse Incision for Abdominoperineal Excision of Rectum (Coller).....	2557
Oblique Incisions.....	2559
Subcostal Incision (Kocher).....	2559
McBurney Gridiron Incision.....	2562
Rockey-Davis Incision.....	2564
Lateral Oblique Abdominal Incision with Division of Muscles in Same Direction as Skin Incision (Kocher)....	2565
Comments on Abdominal Incisions.....	2567
COMMENTS ON CLOSURE OF INCISIONS.....	2568
CONTAMINATED WOUNDS.....	2572
DRAINAGE OF ABDOMINAL WOUNDS.....	2573
COMPLICATIONS OF INCISIONS.....	2574
REFERENCES.....	2575

INDEX TO VOLUMES ONE, TWO AND THREE..... *i to lxxxix*

CHAPTER 10

The Anorectal Tract

The anorectal tract is the terminal portion of the alimentary canal and consists of the rectum, the anal canal, and the anus, proceeding from above downward.

EMBRYOLOGY

In the early weeks of embryonic development, the hindgut ends blindly in the caudal end of the embryo. While the gut still is in communication with the allantois (primitive bladder) it receives the early genital and urinary ducts and forms an evanescent structure, known as the *cloaca* (Fig. 1025). This blind pouch is separated from the outside posteriorly by the cloacal membrane.

The inner layer of the cloacal membrane is entodermal and the external layer, ectodermal. The mesodermal tissue grows downward in the frontal plane at the angle where the allantois joins the hindgut and divides the cloaca into rectal and urogenital divisions. This downward-growing wedge of tissue is the *cloacal* or *urorectal septum*. The primitive rectum lies dorsal to the septum and the urogenital component, ventral. The junction of the entodermal and ectodermal elements occurs at the anorectal outlet which lies at the level of the ultimate anal valves and the papillae of Morgagni. The anorectal blood vessels and lymphatics from above meet those from below at this "watershed." Abnormal development at the caudal end of the embryo results in many anomalies in the anorectal and lower genitourinary tracts.

Various developmental anomalies (Figs 1026–1028) are the result of failure of the hindgut to unite with the external elements of the embryo to form the anorectal passage. The rectum may end in a blind pouch within the pelvis, and the ectodermal elements may fail to form any semblance of an anus or anal canal. The anus and anal canal may be entirely developed except at the junction with the hindgut (anal plate), thereby leaving a partition between the anal canal and the rectal pouch. This partition varies from a simple membrane to a thick band. The rectal pouch may be connected with the outside by a fistulous canal which opens on the perineum, scrotum, prepuce or the vaginal orifice. The fistulous tract may end in the vagina, bladder or urethra. Some constricting deformities of the anus and rectum are congenital in origin.

ANATOMY

The *rectum* begins at the rectosigmoid junction, which is the point at which the pelvic portion of the sigmoid colon merges imperceptibly into the more distal rectum, and which is usually situated at the level of the third sacral vertebra. From this beginning the rectum passes downward, following the sacrococcygeal curve, to pass through the pelvic floor formed by the levator ani muscles and to merge immediately with the anal canal by which it communicates to the exterior. This line

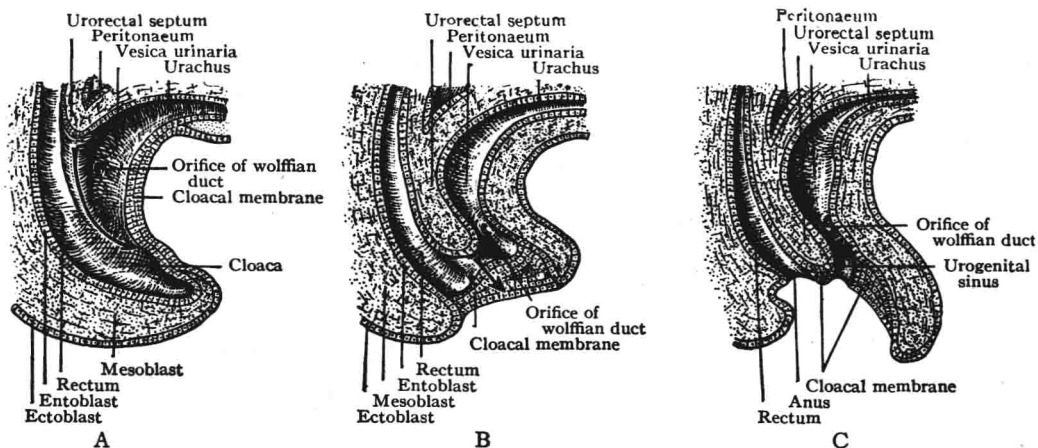


Fig. 1025. Diagram of the development of the rectum, anus and bladder. In A, the arrow indicates the direction of growth of the uro(an)orectal septum toward the cloacal membrane. B, The urorectal septum has almost partitioned the cloaca into vesical and rectal compartments. C, The urorectal septum has reached the cloacal membrane, which has given way at the caudal termination of the bladder and rectum; separate exits are formed for these structures.

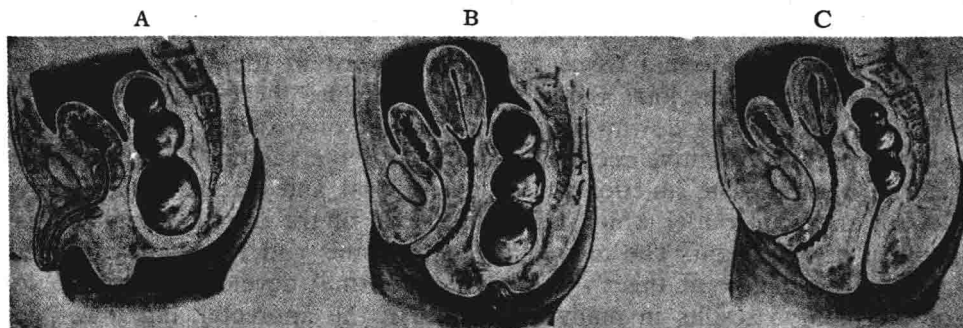


Fig. 1026. Anomalies in the development of the pelvic and anal portions of the rectum. A, Complete absence of the anus; B, failure of the pelvic rectum to connect with the anal depression; C, the terminal part of the pelvic rectum and the anal canal are greatly narrowed.

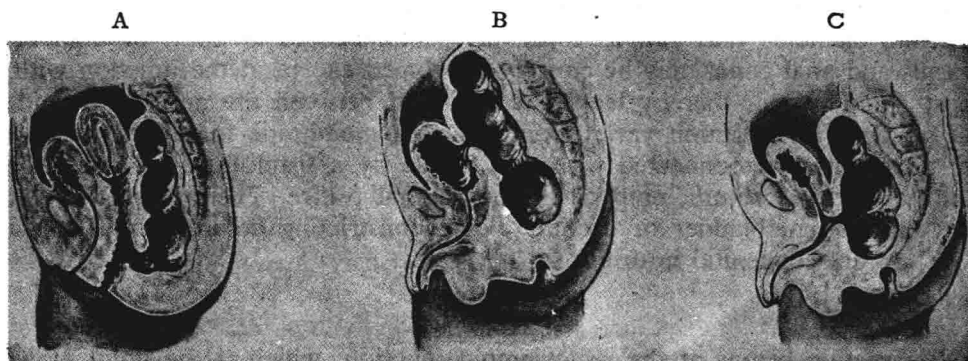


Fig. 1027. Anomalies in the development of the rectum and the urogenital apparatus. A, The pelvic rectum opens into the vagina; there is complete absence of the anal canal. B, The pelvic rectum opens into the bladder; parts of the anal canal and terminal pelvic rectum are absent. C, The pelvic rectum opens into the male urethra; parts of the anal canal and terminal pelvic rectum are absent. These conditions are known as atresia ani vaginalis, atresia ani vesicalis, and atresia ani urethralis.

of junction of the rectum with the anal canal is called the *dentate line* (dentate margin, pectinate line, mucocutaneous juncture and anorectal line are synonymous terms), and is the point at which the entodermal cloaca merges with the ectodermal proctodeum invaginating from the anus during the course of embryologic development. Hence, the dentate line marks not only the termination of the rectum, but also an abrupt change in the type of cells lining the alimentary canal, for mucous

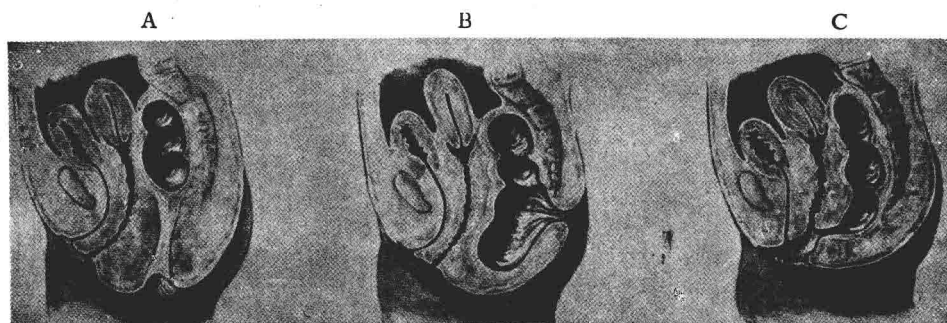


Fig. 1028. Anomalies in the development of the rectum and urogenital apparatus. A, The anorectal tract is impervious and fibrous; B, the pelvic rectum opens just below the coccyx; C, there is a cloaca formation in which the bladder, vagina and rectum open into a common cavity.

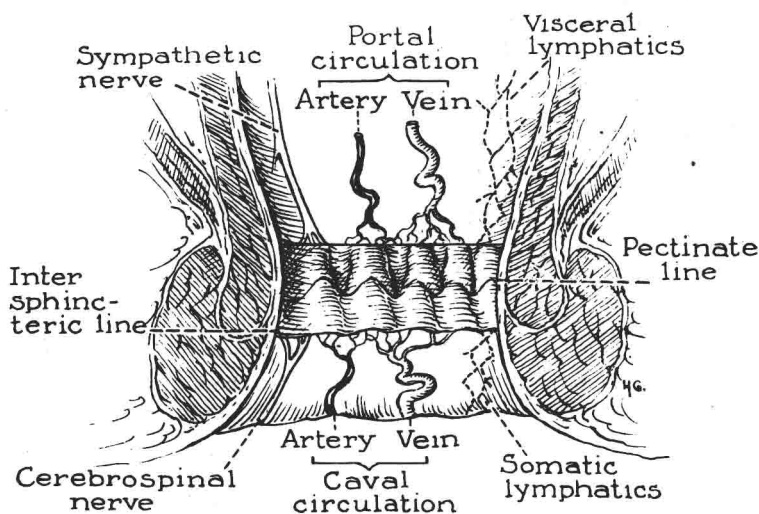


Fig. 1029. Surgical anatomy of the anorectal region. (Partipilo: Surgical Technique and Principles of Operative Surgery, ed. 3, Lea & Febiger.)

membrane lines the rectum above the dentate line while modified anal skin lines the anal canal below that line. The junction of the posterior walls of the rectum and anal canal is at an acute or right angle producing a posterior anorectal shelf (Fig. 1029).

The rectum varies in length in different individuals, but the average distance from its beginning at the rectosigmoid to its termination at the dentate line is given as 12 to 15 cm. Its lumen is relatively small at the rectosigmoid, which is the narrowest portion of the large intestine, but increases in diameter as it passes downward into the hollow of the sacrum where it becomes the widest portion of the

large bowel and is called the ampulla. The rectum then narrows again just before it passes through the pelvic floor to terminate at the dentate line (Fig. 1030).

The rectum is composed of four coats: serous (peritoneal), muscular, submucous and mucous.

The *peritoneal coat* is present only on the anterior and lateral walls of the upper portion of the rectum. It thus covers about two-thirds of the circumference of this portion of the structure and provides a mesentery called the mesorectum

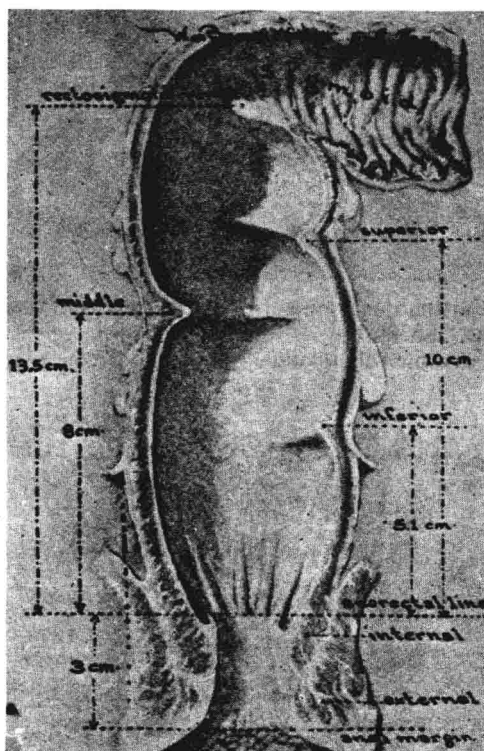


Fig. 1030. Coronal section showing the average distances of the various valves of Houston and rectosigmoid junction from the anal margin and anorectal margin. (Bacon: The Anus, Rectum and Sigmoid Colon, ed. 3, Vol. I. J. B. Lippincott Company.)

which is continuous with the mesosigmoid. In the male the peritoneum is reflected anteriorly from the rectum to the bladder at the level of the seminal vesicles to form the retrovesical pouch (Fig. 1031). In the female the peritoneum is reflected anteriorly from the rectum to the vaginal wall a little below the posterior fornix of the vagina to form the rectouterine pouch (cul-de-sac of Douglas) (Fig. 1032). This pouch is situated lower than its homologue in the male as it descends to within 7.5 cm. of the anus, but in both males and females these pouches are accessible to digital examination of the rectum. Primary carcinomas of the stomach occasionally metastasize to these pouches to form a palpable "rectal shelf" which may be of both diagnostic and prognostic importance.

In both males and females the peritoneum is reflected on each side from the anterior part of the rectum to the posterior wall of the pelvis to form the pararectal fossae. The peritoneal reflection is at the level of the middle valve of Houston.