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CONTENTS

NUMBER 1, JULY

CLINICAL UROLOGY

Review Article

- Impact of Antisperm Antibodies on Human Infertility. *S. L. Mandelbaum, M. P. Diamond and A. H. DeCherney* 1

Original Articles

- Low Level of Superoxide Dismutase Activity in Pheochromocytoma. *T. Nakada, H. Koike and T. Katayama* 9
- Urinary Lithiasis in Black Population: Epidemiological Study and Review of Literature. *I. Sarmina, J. P. Spirnak and M. I. Resnick* 14
- Radiation Exposure to Patients During Extracorporeal Shock Wave Lithotripsy. *F. L. Van Swearingen, D. L. McCullough, R. Dyer and B. Appel* 18
- Ultrasound in Patients With Blunt Renal Trauma Managed by Surgery. *G. Jakse, A. Furtschegger and G. Egender* (Editorial Comment by W. G. Guerriero) 21
- Tubule Recovery After Obstructive Nephropathy Relief: Value of Enzymuria and Microproteinuria. *G. Tataranni, R. Farinelli, G. Zavagli, G. Logallo and A. Farinelli* 24
- Intravenous Digital Subtraction Angiography in Evaluation of Potential Renal Donors. *S. K. Sussman, J. L. Weinerth, S. D. Braun, M. Saeed, F. F. Illescas, R. H. Cohan, G. E. Newman, L. M. Perlmutter and N. R. Dunnick* (Editorial Comment by A. I. Sagalowsky) 28
- Beneficial Effects of Thoracic Duct Drainage in HLA-1 Haplotype Identical Kidney Transplantation. *S. Ohshima, Y. Ono, T. Kinukawa, O. Matsuura, N. Takeuchi and R. Hattori* 33
- Ureteral Perforation During Ureterorenoscopy: Treatment and Management. *E. V. Kramolowsky* 36
- Construction of Low Pressure Reservoir and Achievement of Continence After "Diversion" and in End Stage Vesical Dysfunction. *R. Steinberg, C. Bennett, J. Konnak, J. Savastano and E. McGuire* 39
- Increased Mast Cells of Bladder in Suspected Cases of Interstitial Cystitis: Possible Disease Marker. *J. T. Feltis, R. Perez-Marrero and L. E. Emerson* 42
- Secondary Amyloidosis of Bladder: Cause of Massive Hematuria. *M. J. Nurmi, T. O. Ekfors and P. V. Puntala* 44
- Radical Cystectomy for Carcinoma of Bladder in Elderly Patient. *D. P. Wood, Jr., J. E. Montie, J. T. Maatman and G. J. Beck* 46
- Vesicorenal Reflux and Upper Urinary Tract Transitional Cell Carcinoma After Transurethral Resection of Recurrent Superficial Bladder Carcinoma. *J. A. De Torres Mateos, J. M. Banús Gassol, J. Palou Redorta and J. Morote Robles* 49
- Pharmacological Erection: Diagnosis and Treatment Applications in 69 Patients. *R. E. Nellans, L. R. Ellis and D. Kramer-Levien* (Editorial Comment by T. F. Lue) 52
- Bulbocavernosus Reflex to Somatic and Visceral Nerve Stimulation in Normal Subjects and in Diabetics With Erectile Impotence. *Y. Sarica and I. Karacan* 55
- Experience in Vibratory and Electro-Ejaculation Techniques in Spinal Cord Injury Patients: Preliminary Report. *M. Sarkarati, A. B. Rossier and B. A. Fam* (Editorial Comment by J. G. Blaivas) 59
- Tunica Wedge Excision to Correct Penile Curvature Associated With Inflatable Penile Prosthesis. *J. J. Mulcahy and R. G. Rowland* 63
- Infectious Complications of Penile Prosthetic Implants. *J. V. Thomalla, S. T. Thompson, R. G. Rowland and J. J. Mulcahy* 65
- Periprosthetic Infections. *D. K. Montague* 68
- Fertility Status of Patients With Clinical Stage I Testis Tumors on Surveillance Protocol. *P. R. Carroll, M. J. Morse, W. F. Whitmore, Jr., P. C. Sogani, L. Klotz, H. W. Herr, W. R. Fair, R. Feldshuh and R. S. K. Chaganti* (Editorial Comment by J. P. Donohue) 70
- Bilateral Testicular Germ Cell Tumors: Report of 20 Cases. *K. Scheiber, D. Ackermann and U. E. Studer* (Editorial Comment by J. P. Donohue) 73
- Localization of Solitary and Multiple Metastases in Stage II Nonseminomatous Testis Tumor as Basis for Modified Staging Lymph Node Dissection in Stage I. *L. Weissbach and E. A. Boedefeld* (Editorial Comments by J. P. Donohue and P. C. Peters) 77
- Epididymitis: Aspects Concerning Etiology and Treatment. *M. D. Melekos and H. W. Asbach* 83
- Antibiotic Prophylaxis of Urinary Tract Infection After Transurethral Resection of Prostate: Randomized Study. *M. Charton, G. Vallancien, B. Veillon and J. M. Brisset* (Editorial Comment by D. T. Uehling). 87
- Does Transurethral Resection of Prostate Promote Metastatic Disease? *D. F. Paulson and E. B. Cox* 90
- Correlation of Clinical Stage, Serum Prostatic Acid Phosphatase and Preoperative Gleason Grade With Final Pathological Stage in 275 Patients With Clinically Localized Adenocarcinoma of Prostate. *J. E. Oesterling, C. B. Brendler, J. I. Epstein, A. W. Kimball, Jr. and P. C. Walsh* (Editorial Comment by D. F. Paulson) 92

Blunt Urinary Tract Trauma: Identifying Those Patients Who Require Radiological Diagnostic Studies. <i>S. W. Hardeman, D. A. Husmann, H. K. W. Chinn and P. C. Peters</i>	99
Urologists at Work	
Reconstruction of Fossa Navicularis. <i>G. H. Jordan</i>	102
Flexible Cystoscope Holder/Surgical Retractor That Really Works. <i>M. J. Manyak, F. S. Harrington and E. Glatstein</i>	105
Pediatric Articles	
Role of Vesicostomy in Management of Anterior Urethral Valves in Neonates and Infants. <i>H. G. Rushton, T. S. Parrott, J. R. Woodard and M. Walther</i>	107
Megalourethra: Surgical Technique for Correction of Unusual Variant. <i>J. R. Locke and H. N. Noe</i>	110
Editorials	
Desmoid Tumors. <i>J. P. Donohue</i>	112
Prosthetic Infections. <i>F. B. Scott</i>	113
Clinicopathological Conference	
Neuropathy and Orchialgia in 40-Year-Old Man. <i>S. Rosenthal, Y.-D. Kim and G. J. Wise</i>	114
Case Reports	
Percutaneous Endoscopic Fulguration of Large Volume Caliceal Diverticulum. <i>J. C. Hulbert, S. Lapointe, P. K. Reddy, D. W. Hunter and W. Castaneda-Zuniga</i>	116
Retroiliac Ureter With Contralateral Transverse Malrotation of Kidney: Treated by Crossed Ureterocaliceal Anastomosis. <i>N. P. Gupta, I. S. Gill and V. Bhatia</i>	118
Spontaneous Renal Rupture: Evaluation by Computerized Tomography. <i>B. A. Belkin and H. S. Vine</i>	120
Computerized Tomography of Castleman's Disease Simulating False Renal Artery Aneurysm. <i>L. Friedman, B. Dubowitz, B. Papert and P. Porteous</i>	123
En Bloc Kidney and Bladder Transplantation From Anencephalic Donor Into Adult Recipient. <i>J. L. Gutierrez Calzada, J. L. Martinez, V. Baena, G. Laguna, J. Arrieta, J. Rodriguez and A. Moncada</i>	125
Same-Session Endourological Removal of Upper and Impacted Lower Urinary Tract Stones With Aid of Prone Flexible Cystoscopy. <i>M. Eshghi and J. C. Addonizio</i> (Editorial Comment by A. D. Smith)	127
Ureteral Obstruction by Rare Venous Anomaly. <i>K. E. Psihramis</i>	130
Treatment of Ureteral Obstruction in Gardner's Syndrome: Renal Autotransplantation. <i>J. K. Lattimer, J. Birkhoff and C. A. Olsson</i>	133
Prolapsed Ureterocele Presenting as Vulval Mass in Woman. <i>L. K. Sahu and R. Mohanty</i>	136
Alternative Technique for Undiverting Sigmoid Conduit. <i>B. Goldwasser, D. M. Barrett and S. A. Kramer</i> ..	137
Urinary Undiversion and Implantation of Artificial Urinary Sphincter in 73-Year-Old Man. <i>I. J. Fishman, R. Shabsigh and F. B. Scott</i>	140
Generalized Hypersensitivity Reaction to Intravesical Thiotepa and Doxorubicin. <i>M. Lee and R. Sharifi</i> ..	143
Mesenteric Desmoid Tumor Presenting as Abdominal Mass Following Salvage Cystectomy for Invasive Bladder Cancer. <i>R. M. Pasciak and J. M. Kozlowski</i>	145
Diverticulum of Female Urethral Roof Managed Endoscopically. <i>W. F. Spencer and S. B. Stroom</i>	147
Testicular Torsion in 62-Year-Old Man. <i>H. J. Alfert and D. A. Canning</i>	149
Pseudocysts of Tunica Albuginea: Benign Invasion by Testicular Tubules. <i>S. S. Schmidt and T. M. Minckler</i>	151
Giant Desmoid Tumor of Abdominal Wall Masquerading as Recurrent Testicular Cancer. <i>T. J. Gianis, P. M. Carey and R. B. Bracken</i>	152
Large Brushite Stone in Dilated Prostatic Urethra. <i>H. Kato and A. Ogawa</i>	154
Letter to the Editor	
Purchase of Extracorporeal Lithotripter. <i>A. H. Horan</i>	156
INVESTIGATIVE UROLOGY	
Pharmacological Characteristics of Smooth Muscle in Benign Prostatic Hyperplasia and Normal Prostatic Tissue. <i>S. Kitada and J. Kumazawa</i>	158
Acute Mechanical Dilation of Ureter: Experimental Study. <i>P. T. Hunter, III, R. C. Newman and B. Finlayson</i>	161
Enzyme Release From Polymorphonuclear Leukocytes During Interaction With Calcium Oxalate Microcrystals. <i>J. G. R. Elferink and M. Deierkauf</i>	164
Prediction of Metastatic Potential by New Grading System of Cell Motility: Validation in Dunning R-3327 Prostatic Adenocarcinoma Model. <i>J. L. Mohler, A. W. Partin and D. S. Coffey</i>	168
Blood Group ABO and Lewis Antigens in Fetal and Normal Adult Bladder Urothelium: Immunohistochemical Study of Type 1 Chain Structures. <i>T. F. Ørntoft, H. Wolf, H. Clausen, S.-I. Hakomori and E. Dabelsteen</i>	171
Penile Blood Flow and Musculovascular Events During Sleep-Related Erections of Middle-Aged Men. <i>I. Karacan, M. Hirshkowitz, P. J. Salis, E. Narter and M. F. Safi</i>	177

Heparin Prevention of Tumor Cell Adherence and Implantation on Injured Urothelial Surfaces. <i>W. A. See and P. H. Chapman</i>	182
Effect of Papaverine on Arterial and Venous Hemodynamics of Erection. <i>C. Delcour, E. Wespes, G. Vandenbosch, C. C. Schulman and J. Struyven</i>	187
Effect of Streptozotocin-Induced Diabetes on Neuroendocrine-Male Reproductive Tract Axis of Adult Rat. <i>L. Seethalakshmi, M. Menon and D. Diamond</i>	190
Pulsed Dye Laser for Fragmenting Urinary Calculi. <i>G. Watson, S. Murray, S. P. Dretler and J. A. Parrish</i> . Assessment of Pulsed Dye Laser for Fragmenting Calculi in Pig Ureter. <i>G. Watson, S. Murray, S. P. Dretler and J. A. Parrish</i>	195
Percutaneous Nephrostomy: Assessment of Renal Damage Associated With Semi-Rigid (24F) and Balloon (36F) Dilatation. <i>R. V. Clayman, J. Elbers, R. P. Miller, J. Williamson, D. McKeel and W. Wassinger</i> ..	203
Monoclonal Antibody to Human Transitional Cell Carcinoma of Bladder: Production and Characterization. <i>N. Takahashi, S. Takahashi, K. Takahashi, T. Suzuki and T. Funyu</i>	207
Effect of Adrenergic and Cholinergic Drugs on Noradrenergic Transmission in Bladder Neck Smooth Muscle. <i>S. Mutoh, S. Ueda, Y. Fukumoto, J. Machida and K. Ikegami</i>	212
Proliferative Response of Rat Accessory Sex Organs to Dietary Sex Hormones After Castration or Initial Dietary Administration of Estrogen. <i>T. Shirai, E. Ikawa, K. Imaida, Y. Tagawa and N. Ito</i>	216

UROLOGICAL SURVEY

Author Index to Abstracts	220
Epididymitis in Children and Adolescents: 20-Year Retrospective Study. <i>L. Likitnikil, G. H. McCracken, Jr., J. D. Nelson and T. P. Voteller</i>	221
Single-Dose Gentamycin Therapy of Recurrent Urinary Tract Infection in Patients With Normal Urinary Tracts. <i>A. J. Khan, K. Kumar and H. E. Evans</i>	221
Coordinated Multicenter Study of Norfloxacin Versus Trimethoprim-Sulfamethoxazole Treatment of Symptomatic Urinary Tract Infections. <i>Urinary Tract Infection Study Group</i>	221
Phaeochromocytoma in Elderly: Poorly Recognized Entity. <i>M. E. Cooper, D. Goodman, A. Frauman, G. Jerums and W. J. Louis</i>	222
Renal Cell Carcinoma in von Hippel-Lindau Syndrome. <i>R. S. Malek, P. J. Omess, R. C. Benson, Jr. and H. Zincke</i>	222
Serum Iron: Tumour Marker in Renal Carcinoma. <i>K. R. Loughlin and R. F. Gittes</i>	222
Treatment of Multiple Superficial Transitional Cell Carcinoma of Bladder With Intravesical Yttrium-90. <i>C. J. Alcock, K. R. Durrant, J. C. Smith and G. J. Fellows</i>	222
Histopathology of BCG and Thiotepa Treated Bladders. <i>P. Guinan, M. Shaw and V. Ray</i>	223
Results of Surgery Following Radical Radiotherapy for Invasive Bladder Cancer. <i>P. M. Quilty, W. Duncan, G. D. Chisholm, J. W. Fowler, T. B. Hargreave, J. E. Newsam and D. A. Tolley</i>	223
Prostatic Carcinoma: Complications of Megavoltage Radiation Therapy. <i>J. Lindholt and P. T. Hansen</i> ..	223
Hypophosphatemic Osteomalacia and Adult Fanconi Syndrome Due to Light-Chain Nephropathy. Another Form of Oncogenous Osteomalacia. <i>D. S. Rao, A. M. Parfitt, A. R. Villanueva, P. J. Dorman and M. Kleerekoper</i>	223
Treatment of Cancer-Associated Hypercalcemia With Cisplatin. <i>T. E. Lad, H. M. Mishoulam, D. H. Shevirin, L. J. Kukla, E. C. Abramson and S. C. Kukreja</i>	224
Incidence, Prevalence, and Evidence. Scientific Problems in Epidemiologic Statistics for Occurrence of Cancer. <i>A. R. Feinstein and J. M. Esdaile</i>	224
Elevated Beta-Human Chorionic Gonadotropin and Search for Cancer. <i>T. S. Kaluzynski, V. V. Gossain, D. R. Rouner and M. Fatteh</i>	224
Rice-Bran Treatment for Calcium Stone Formers With Idiopathic Hypercalciuria. <i>S. Ebisuno, S. Morimoto, T. Yoshida, T. Fukatani, S. Yasukawa and T. Ohkawa</i>	224
Analysis of Urinary Calculi Using Photon Induced X-Ray Fluorescence (XRF). <i>R. Cesareo, V. Bisceglie, L. J. Pedraza, M. Gallucci, G. Apli and F. Di Silverio</i>	225
Pathophysiology of Stone Formation. <i>W. G. Robertson</i>	225
Clinical Aspects of Stone Formation and Conservative Treatment. <i>B. Ulshöfer</i>	225
Percutaneous Litholapaxy. <i>K. Korth and U. Bernius</i>	225
Extracorporeal Shock Wave Lithotripsy. <i>D. Jocham, C. Chaussy and E. Schmiedt</i>	226
Combination of Percutaneous Surgery and Extracorporeal Shockwave Lithotripsy for Treatment of Large Renal Calculi. <i>I. K. Dickinson, M. S. Fletcher, M. J. Bailey, M. J. Coptcoat, T. A. McNicholas, M. J. Kellett, H. N. Whitfield and J. E. A. Wickham</i>	226
Complications of Extracorporeal Shockwave Lithotripsy: Management and Prevention. <i>M. J. Coptcoat, D. R. Webb, M. J. Kellett, M. S. Fletcher, T. A. McNicholas, I. K. Dickinson, H. N. Whitfield and J. E. A. Wickham</i>	226
Ureterorenoscopy in Treatment of Ureteral Stones. <i>K.-H. Bichler and S. Halim</i>	226
Safety and Efficacy of Warfarin Started Early After Submassive Venous Thrombosis or Pulmonary Embolism. <i>A. Gallus, J. Jackaman, J. Tillett, W. Mills and A. Wycherley</i>	227
Spontaneous Relapse of Naproxen-Related Nephrotic Syndrome. <i>M. Schwartzman and V. D'Agati</i>	227
Circulating and Tissue Angiotensin Systems. <i>D. J. Campbell</i>	227
Glomerular Prostaglandins, Angiotensin II, and Nonsteroidal Anti-Inflammatory Drugs. <i>L. Scharschmidt, M. Simonson and M. J. Dunn</i>	228

Prostaglandins in Urology. <i>F. M. J. Debruyne and C. M. G. Thomas</i>	228
Pyeloureterostomy or Ureteroneocystostomy in Renal Transplantation. <i>R. Landau, J. R. Botha and J. A. Mayburgh</i>	228
Editorial: Antibacterial Therapy and Prophylaxis in Transurethral Surgery. <i>P. O. Madsen</i>	228
Is Male Infertility Clinic of Any Use? <i>T. B. Hargreave, B. McGowan, J. Harvey, M. McParland and R. A. Elton</i>	228
Successful Treatment of Oligospermic and Azoospermic Men With α -1-Blocker and β -Stimulator: New Treatment for Idiopathic Male Infertility. <i>M. Yamamoto, H. Takaba, J. Hashimoto, K. Miyake and H. Mitsuya</i>	229
Transmission of Chlamydia Trachomatis by Artificial Insemination. <i>T. C. Nagel, G. E. Tagatz and B. F. Campbell</i>	229
Simple and Effective Technique for Increasing Pregnancy Rates in Couples With Retrograde Ejaculation. <i>R. L. Urry, R. G. Middleton and S. McGavin</i>	229
Frozen Semen: Efficiency in Artificial Insemination and Advantage in Testing for Acquired Immune Deficiency Syndrome. <i>J. K. Sherman</i>	229
Penile Hypercoagulability During Erection: Possible Predisposing Factor to Ageing Penile Vascular Changes. <i>M. S. Bornman, D. J. du Plessis, W. J. C. Coetzee and R. C. Franz</i>	230
Endoscopic Correction of Primary Vesicoureteric Reflux. <i>B. O'Donnell and P. Puri</i>	230
Long-Term Renal Risk Factors in Children With Meningomyelocele. <i>A. S. Brem, D. Martin, J. Callaghan and J. Maynard</i>	230
Acquired Undescended Testes. <i>K. A. Schiffer, S. J. Kogan, E. F. Reda and S. B. Levitt</i>	230
Sexual Abuse of Children: Update. <i>K. C. Finkel</i>	231
Selective Sacral Nerve Blockade for Treatment of Unstable Bladders. <i>S. C. Müller, D. Frohneberg, R. Schwab and J. W. Thüroff</i>	231
Non-Invasive Measurement of Intravesical Pressure. <i>K. K. Sethia and J. C. Smith</i>	231
Acute Primary Hyperparathyroidism. <i>L. A. Fitzpatrick and J. P. Bilezikian</i>	232
Immunohistochemical Analysis of Human Bladder. <i>R. A. Gardiner, G. J. Seymour, M. F. Lavin, G. M. Stratton, E. Gemmell and G. Hazan</i>	232
Ureteroscopic Pyelolysis for Pelviureteric Junction Obstruction. <i>J. A. Inglis and D. A. Tolley</i>	232
Effect of Age on Autonomic Innervation of Urinary Bladder. <i>S. A. Gilpin, C. J. Gilpin, J. S. Dixon, J. A. Gosling and R. S. Kirby</i>	232
Sexual Medicine Emerging Field, Meeting Reveals. <i>S. Katz</i>	232
Endourology, by C. C. Carson and N. R. Dunnick. <i>R. P. Myers</i>	233
Urologic Endocrinology, by J. Rajfer. <i>A. Thomas</i>	233

Current Literature	234
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News and Announcements

Ramon Guiteras Award	238
Ferdinand C. Valentine Award	238
Hugh Hampton Young Award	238
AUA Gold Cystoscope Award	238
Russell and Mary Hugh Scott Education Award	238
William P. Didusch Award	239
Distinguished Service Award	239
AUA Health Science Award	239
Deaths	240

NUMBER 2. AUGUST

CLINICAL UROLOGY

Review Article

Antimicrobial Agents in Transurethral Prostatic Resection. <i>M. Grabe</i>	245
--	-----

Original Articles

PICA/Burden: Staging System for Upper Tract Urinary Stones. <i>D. P. Griffith and L. Valiquette</i>	253
Pyridoxilate-Induced Calcium Oxalate Calculi: New Drug-Induced Metabolic Nephrolithiasis. <i>M. Daudon, R.-J. Reveillaud, M. Normand, C. Petit and P. Jungers</i> (Editorial Comment by M. J. V. Smith)	258
Outpatient Irrigation of Renal Collecting System With 10 Per Cent Hemiacidrin: Cumulative Experience of 365 Days in 13 Patients. <i>J. M. Palmer, M. B. Bishai and D. S. Mallon</i> (Editorial Comment by S. P. Dretler)	262
Management of Renal Artery Injuries From External Trauma. <i>A. S. Cass and M. Luxenberg</i>	266
Squamous Cell Carcinoma of Renal Pelvis. <i>M. K. Li and W. L. Cheung</i>	269
Diuresis Renography and Simultaneous Renal Pelvic Pressure in Hydronephrosis. <i>E. U. Poulsen, J. Frøkjær, F. Taagehøj-Jensen, T. M. Jørgensen, J. P. Nørgaard, M. Hedegaard and J. C. Djurhuus</i>	272
Ureteropelvic Junction Obstruction. I. Observations on Classic Type in Adults. <i>W. R. Clark and R. S. Malek</i>	276

Flexible Ureteropyeloscopy: Diagnosis and Treatment in Upper Urinary Tract. <i>D. H. Bagley, J. L. Huffman and E. S. Lyon</i>	280
Percutaneous Ureterostomy. <i>A. D. Smith, R. Moldwin and G. Karlin</i> (Editorial Comments by P. H. Lange, J. W. Segura and R. V. Clayman)	286
New Method for Conversion of Ileal Conduit to Continent Nonrefluxing Reservoir: Sandwich Technique. <i>M. K. Hanna</i>	289
Ureteral Carcinoma In Situ After Successful Intravesical Therapy for Superficial Bladder Tumors: Incidence, Possible Pathogenesis and Management. <i>H. W. Herr and W. F. Whitmore, Jr.</i> (Editorial Comment by W. J. Catalona)	292
Single Course Versus Maintenance Bacillus Calmette-Guerin Therapy for Superficial Bladder Tumors: Prospective, Randomized Trial. <i>M. A. Hudson, T. L. Ratliff, D. P. Gillen, E. O. Haaff, S. M. Dresner and W. J. Catalona</i> (Editorial Comments by J. B. deKernion and D. L. Lamm)	295
Intravesical Bacillus Calmette-Guerin in Treatment of Superficial Transitional Cell Carcinoma of Bladder. <i>V. Pansadoro and F. De Paula</i>	299
Intra-Arterial Cisplatin for Bladder Cancer. <i>D. J. Stewart, L. Eapen, W. E. Hirte, N. G. Futter, D. E. Moors, P. G. Murphy, A. H. Irvine, P. Genest, D. E. McKay, W. K. Evans, P. Rasuli, R. A. Peterson and J. A. Maroun</i>	302
Endoscopic Reconstruction of Traumatic Membranous Urethral Transection. <i>F. F. Marshall, R. Chang and J. P. Gearhart</i>	306
Application of Intracavernous Injection of Vasoactive Medications for Erection in Men With Spinal Cord Injury. <i>D. R. Bodner, R. Lindan, E. Leffler, E. D. Kursh and M. I. Resnick</i>	310
Salvage of Eroded Inflatable Penile Prosthesis: New Concept. <i>W. L. Furlow and B. Goldwasser</i>	312
Laser Microsurgery for Superficial Lesions of Penis. <i>G. Bandieramonte, P. Lepera, R. Marchesini, S. Andreola and G. Pizzocaro</i> (Editorial Comment by J. A. Smith, Jr.)	315
Clinical Spectrum of Granulomatous Prostatitis: Report of 200 Cases. <i>T. J. Stillwell, D. E. Engen and G. M. Farrow</i>	320
Decrease of Serum Testosterone by Cyproterone Acetate Accompanied by Unexpected Increase of Calcitonin Secretion Capacity. <i>H. Mulder, D. Eland, W. H. L. Hackeng and W. Schopman, Jr.</i>	324
Study of Calcium Phosphate Crystalluria. <i>K. Tozuka, Y. Yonese, T. Konjiki and T. Sudo</i>	326
Examination of Strains of Lactobacilli for Properties That May Influence Bacterial Interference in Urinary Tract. <i>G. Reid, R. L. Cook and A. W. Bruce</i>	330
Suppression and Treatment of Urinary Tract Infection in Patients With Intermittently Catheterized Neurogenic Bladder. <i>J. L. Mohler, D. L. Cowen and R. C. Flanigan</i>	336
Ex Vivo Comparison of Radiological and Histological Evaluation of Early Metastatic Lesions of Pelvic Lymph Nodes From Carcinoma of Bladder or Prostate. <i>H. Komatsu, S. Hayashi, N. Tanabe, N. Shirasu, Y. Takihana, K. Takei, T. Ishihama, K. Tago, Y. Yamada, A. Ueno and G. Uchiyama</i> (Editorial Comment by J. E. Pontes)	341

Urologists at Work

Ileal S-Pouch for Bladder Replacement After Cystectomy: Preliminary Report of 7 Cases. <i>R. Tscholl, H. J. Leisinger and D. Hauri</i> (Editorial Comment by D. G. Skinner)	344
Technical Nuances and Surgical Results of Radical Retropubic Prostatectomy in 150 Patients. <i>P. H. Lange and P. K. Reddy</i>	348

Pediatric Articles

Continuous Ambulatory Peritoneal Dialysis: Pediatric Experience. <i>M. R. Zaontz, R. A. Cohn, D. I. Moel, N. Majkowski and C. F. Firlit</i>	353
Expanded Role of Transureteroureterostomy in Pediatric Urology. <i>H. G. Rushton, T. S. Parrott and J. R. Woodard</i> (Editorial Comment by R. M. Ehrlich)	357
Lower Extremity Cyanosis: Unusual Presentation of Congenital Paraureteral Diverticula. <i>R. Valadez, M. Maizels and S. K. Fernbach</i>	364
Hamartoma of Bladder in 4-Year-Old Girl With Hamartomatous Polyps of Gastrointestinal Tract. <i>M. A. Keating, R. H. Young, C. W. Lillehei and A. B. Retik</i>	366
Urethral Obstruction Owing to Retroperitoneal Cystic Lymphangioma. <i>S. Kanzaki, A. Arata, B. Suyama, T. Ohmura, K. Yamada, M. Miyake and S. Enomoto</i>	370
Chordee Without Hypospadias: Complications and Management of Hypoplastic Urethra. <i>R. S. Hurwitz, D. Ozersky and H. J. Kaplan</i> (Editorial Comment by N. B. Hodgson)	372
Onlay Island Flap in Repair of Mid and Distal Penile Hypospadias Without Chordee. <i>J. S. Elder, J. W. Duckett and H. M. Snyder</i>	376
Augmented Duckett Repair for Severe Hypospadias. <i>K. I. Glassberg</i>	380
Laparoscopy in Management of Nonpalpable Testis. <i>R. M. Weiss and J. H. Seashore</i>	382
Newborn Granulosa Cell Tumor of Testis. <i>D. T. Uehling, J. E. Smith, R. Logan and G.-R. Hafez</i>	385
Transposition of External Genitalia Associated With Caudal Regression. <i>J. M. Lage, S. G. Driscoll and F. R. Bieber</i>	387

Editorials

Problematic Ureteropelvic Junction Obstruction. <i>S. A. Koff</i>	390
Bacillus Calmette-Guerin Immunotherapy. <i>D. L. Lamm</i>	391

Case Reports

Hemophilia and Extracorporeal Shock Wave Lithotripsy. <i>K. L. Partney, R. L. Hollingsworth, W. R. Jordan, D. Beckham and C. R. May</i>	393
Renal Abscess Owing to Salmonella Septicemia: Percutaneous Drainage. <i>J. Kaneti and Y. Hertzanu</i>	395
Multilocular Cystic Nephroma in Adult: Immunohistochemical Study. <i>T. Aoyagi, K. Kakudo, S. Satoh, J. Hata, M. Shiramizu and N. Tamaoki</i>	397
Primary Malignant Fibrous Histiocytoma of Kidney. <i>G. Kollias and T. Giannopoulos</i>	400
Acute Nonlymphocytic Leukemia After Thiotepa Instillation Into Bladder: Report of 2 Cases and Review of Literature. <i>J. M. Silberberg and M. H. Zarrabi</i>	402
Fibrosis of Tunica Albuginea: Complication of Long-Term Intracavernous Pharmacological Self-Injection. <i>K.-N. Hu, C. Burks and W. C. Christy</i>	404
Transitional Cell Carcinoma in Muir-Torre Syndrome. <i>D. J. Grignon, D. T. Shum and O. Bruckschwaiger</i>	406

Letters to the Editor

Re: Effects of Renal Pelvic Pressure Elevation on Isotope Nephrography and Renal Transit Time, Experimental Study, by R. Tscholl, B. Rehmann, P. Stierli and J. Locher. <i>A. Piepsz, H. R. Ham, F. Collier, M. Hall, M. Verboven and F. Keuppens</i>	409
Re: Initial Bladder Management in Spinal Cord Injury: Does It Make Difference, by L. K. Lloyd, K. V. Kuhlemeier, P. R. Fine and S. L. Stover. <i>J. J. Wyndaele</i>	409
Re: Two Courses of Intravesical Bacillus Calmette-Guerin for Transitional Cell Carcinoma of Bladder, by E. O. Haaff, S. M. Dresner, T. L. Ratliff and W. J. Catalona. <i>H. W. Herr</i>	409
Re: Failure of Jonas Prosthesis, by E. A. Tawil and J. G. Gregory. <i>R. L. Fein</i>	410
Ephedrine: Possible Alternative for Treatment of Penile Erection in Connection With Transurethral Resection of Prostatic or Bladder Tumors. <i>E. Sundien and T. Kolmert</i>	411
Re: Unusual Presentation of Carcinoma of Prostate, by J. Antony and P. S. Reddy. <i>M. R. Shetty</i>	412

INVESTIGATIVE UROLOGY

Partial Ureteric Obstruction in Pubescent Rat. I. Long-Term Effect on Renal Function. <i>S. Josephson, A. Aperia, K. Lännergren and I. Wikstad</i>	414
Vasoactive Intestinal Polypeptide in Relation to Penile Erection in Cat Evoked by Pelvic and by Hypogastric Nerve Stimulation. <i>P.-O. Andersson, J. Björnberg, S. R. Bloom and S. Mellander</i>	419
Reduction of Bacterial Adherence to Catheter Surface With Heparin. <i>M. R. Ruggieri, P. M. Hanno and R. M. Levin</i>	423
Tumor Necrosis Factor Enhances In Vitro and In Vivo Efficacy of Chemotherapeutic Drugs Targeted at DNA Topoisomerase II in Treatment of Murine Bladder Cancer. <i>R. B. Alexander, J. T. Isaacs and D. S. Coffey</i>	427
Effect of Intravesical Administration of Tumor Necrosis Serum and Human Recombinant Tumor Necrosis Factor on Murine Bladder Tumor. <i>K.-E. Lee, R. W. O'Donnell, S. Schoen and A. T. K. Cockett</i>	430
Functional and Structural Characteristics of Glycosaminoglycans of Bladder Luminal Surface. <i>R. E. Hurst, S. W. Rhodes, P. B. Adamson, C. L. Parsons and J. B. Roy</i>	433
Effect of Cigarette Smoking on Penile Erection. <i>K.-P. Juenemann, T. F. Lue, J.-A. Luo, N. L. Benowitz, M. Abozeid and E. A. Tanagho</i>	438
Role of Pelvic Nerve in Dynamics of Micturition in Decerebrate Dog as Determined by Suprapubic Endoscopic and Urodynamic Evaluation. <i>O. Nishizawa, A. Matsuzaki, T. Kohama, H. Noto, H. Nakamura, T. Harada and S. Tsuchida</i>	442
Interaction of Urinary Tamm-Horsfall Protein With Transitional Cells and Transitional Epithelium. <i>J. E. Fowler, Jr., M. Mariano and J. L. T. Lau</i>	446
Urinary Carcinogen (Nitrosamine) Production in Rat Animal Model for Ureterosigmoidostomy. <i>M. S. Cohen, M. E. Hilz, C. P. Davis and M. D. Anderson</i>	449

UROLOGICAL SURVEY

Author Index to Abstracts	454
Urinary Tract Infections and Sexual Activity in Young Women. <i>L. Leibovici, G. Alpert, A. Laor, O. Kalter-Leibovici and Y. L. Danon</i>	455
Vaginal Chlamydia Trachomatis Prevalence in Sexually Abused Prepubertal Girls. <i>C. D. Fuster and L. S. Neinstein</i>	455
Short-Course Amphotericin B Therapy for Isolated Candiduria in Children. <i>D. B. Kohn, D. T. Uehling, M. E. Peters, K. W. Fellows and P. J. Chesney</i>	455
Efficacy and Safety of Aztreonam in Treatment of Serious Gram-Negative Bacterial Infections. <i>J. L. LeFrock, B. R. Smith, P. Chandrasekar, K. V. I. Rolston, A. Molavi and W. Kannangara</i>	456

Accurate Method to Obtain Urine for Cultures in Men With External Catheters. <i>J. G. Ouslander, B. A. Greengold, F. J. Silverblatt and J. P. Garcia</i>	456
Inappropriate Urine Cultures in Hospitalized Patients Receiving Antibiotic Therapy. <i>K. C. Hyams</i>	456
Significance of "Maturation" of Metastases From Wilms' Tumor After Therapy. <i>R. Omar, M. M. Davidian, J. R. Marcus and J. Rose</i>	456
Renal Cell Carcinoma in Patient With Situs Inversus Totalis. <i>J. E. Bertini, Jr. and M. A. Boileau</i>	457
Primary Choriocarcinoma of Mediastinum With Immunohistochemical Study and Review of Literature. <i>S. Kathuria and V. Jablokow</i>	457
Investigation of Blood Group Antigens and Carcinoembryonic Antigen in Urinary Bladder Carcinoma. <i>T. Fujioka, T. Ohhori, L. Lourekovich and J. B. deKernion</i>	457
One-Stage Plastic Reconstruction of Totally Amputated Cancerous Penis Using Unilateral Myocutaneous Gracilis Flap. <i>K. A. Hanash and J. J. Tur</i>	457
Current Role of Chemotherapy in Management of Ovarian Cancer. <i>M. Yakushiji</i>	457
Mesonephric Hamartoma of Seminal Vesicle: Rare Cause of Retrovesical Mass. <i>H. Kinas and M. Kuhn</i>	458
Biochemical Nature of Prostate-Associated Antigen Identified by Monoclonal Antibody, KR-P8. <i>R. H. Raynor, T. A. Hazra, C. W. Moncure and T. Mohanakumar</i>	458
Characterization of Monoclonal Antibodies Raised Against Prostatic Cancer Cell Line PC-82. <i>M. P. W. Gallee, C. C. J. van Vroonhoven, H. A. G. M. van der Korput, T. H. van der Kwast, F. J. W. ten Kate, J. C. Romijn and J. Trapman</i>	458
Monoclonal Antibody Specific to Acid Phosphatase Isoenzyme 4. <i>H. Dang, K.-W. Lam, C.-Y. Li, L. E. Wold, T. Sun and L. T. Yam</i>	458
Interferon- β Treatment of Metastatic Prostate Cancer. <i>M. A. Bulbul, R. P. Huben and G. P. Murphy</i>	459
Danazol Treatment of Advanced Prostate Cancer: Clinical and Hormonal Effects. <i>R. M. Cole, D. Raghavan, I. Catterson, N. Teriana, B. Pearson, J. Boulas and M. Rosen</i>	459
Radiation After Pelvic Lymphadenectomy: Effect on Morbidity. <i>R. J. Babaian and O. F. Aguilar</i>	459
Recurrent Olfactory Neuroblastoma Treated by Radiation, Surgery, and Chemotherapy: "Case Report". <i>B. K. Mohanti, G. K. Rath, B. Baser, S. Bahadur and M. Mathur</i>	459
Selection of Optimal Therapy for Neuroblastoma: Study of Immunomodulatory Effects of Surgery and Irradiation in Murine C1300 Neuroblastoma Model. <i>S. L. Topalian and M. M. Ziegler</i>	460
Three Years of Experience With Random Urinary Homovanillic and Vanillylmandelic Acid Levels in Diagnosis of Neuroblastoma. <i>M. Tuchman, M. L. R. Ramnaraine, W. G. Woods and W. Krivit</i>	460
Chemotherapy for Gestational Trophoblastic Tumors. <i>H. Takamizawa, S. Sekiya, O. Kobayashi and H. Matsui</i>	460
Effect of Imidazoquinazolinones on Tumor Cells in Circulation. <i>J. L. Ambrus, C. M. Ambrus and H. Gastpar</i>	461
Effect of Route of Administration on Selectivity of Hematoporphyrin Derivative for Tumor Tissue. <i>E. B. Elmer, W. C. Wood, A. M. Cohen and M. Bamberg</i>	461
Alternative Method for Repair of Leaking Arterial Chemotherapy Infusion Catheter. <i>J. L. Burkhalter and J. U. Morano</i>	461
Surgeon's Future Role in Conquest of Cancer. <i>W. B. Hutchinson</i>	461
Urolithiasis in Childhood: Current Management. <i>H. Choi, H. M. Snyder, III and J. W. Duckett</i>	461
Idiopathic Hypercalciuria in Children: Pathophysiologic Considerations of Renal and Absorptive Subtypes. <i>F. Santos, D. Suárez, S. Málaga and M. Crespo</i>	462
Intraglomerular Tubular Epithelial Cells: Marker of Glomerular Hematuria. <i>A. J. Valdes and J. Zhang</i>	462
Enterocystoplasty in Management and Reconstruction of Pediatric Neurogenic Bladder. <i>A. A. Sidi, H. Aliabadi and R. Gonzalez</i>	462
Microsurgical Epididymovasostomy in Treatment of Occlusive Azoospermia. <i>I. Fogedstam, M. Fall and S. Nilsson</i>	463
Comparison of Gonadal Function Between Fertile and Infertile Men With Varicoceles. <i>R. R. Nagao, S. R. Plymate, R. E. Berger, E. B. Perrin and C. A. Paulsen</i>	463
Vesicoureteral Reflux in Asymptomatic Siblings of Patients With Known Reflux: Radionuclide Cystography. <i>A. D. Van den Abbeele, S. T. Treves, R. L. Lebowitz, S. Bauer, R. T. Davis, A. Retik and A. Colodny</i>	464
Obstructive Lesions of Lower Urinary Tract in Prune Belly Syndrome. <i>M. H. Hoagland and G. M. Hutchins</i>	464
Posterior Urethral Valves in Newborn: Treatment and Functional Results. <i>K. A. Burbige and T. W. Hensle</i>	464
Abdominoscrotal Hydrocele. <i>J. Booth</i>	464
Penile Agenesis: Report of Six Cases. <i>I. L. Oesch, A. Pinter and R. G. Ransley</i>	465
Neonatal Genital Reconstruction. <i>R. J. Sharp, T. M. Holder, C. P. Howard and J. A. Grunt</i>	465
Role of Collecting Duct in Urinary Concentration. <i>J. P. Kokko</i>	465
Acute Urinary Retention Secondary to Benign Prostatic Hyperplasia. Effect of Alpha-Adrenergic Blockade. <i>M. I. Goodwin, J. F. Chester and J. D. Jenkins</i>	465
Renal Pelvis. <i>B. Schmidt-Nielsen</i>	466
Physician-Scientists and Scientific Physicians. Resolving Humanism-Science Dichotomy. <i>G. L. Engel</i>	466
What is Value of Computer for Physician. <i>M. Juckett and J. S. Spratt</i>	466
Operations in Urology, by P. Clark. <i>E. J. McGuire</i>	466
Current Literature	468

CLINICAL UROLOGY

Special Article

- Trends in Urological Manpower in United States in 1986. *J. S. Ansell* (Editorial Comments by T. D. Allen and J. F. Glenn) 473

Original Articles

- Renal Lesions in Tuberos Sclerosis. *T. J. Stillwell, M. R. Gomez and P. P. Kelalis* 477
- Comparative Value of Ultrasonography, Computerized Tomography, Angiography and Excretory Urography in Staging of Renal Cell Carcinoma. *H. G. W. Frohmüller, J. W. Grups and V. Heller* 482
- Comparison of Results and Morbidity of Percutaneous Nephrostolithotomy and Extracorporeal Shock Wave Lithotripsy. *J. E. Lingeman, T. A. Coury, D. M. Newman, R. J. Kahnoski, J. H. O. Mertz, P. G. Mosbaugh, R. E. Steele and J. R. Woods* 485
- Bladder Irrigation With Chlorhexidine for Prevention of Urinary Infection After Transurethral Operations: Prospective Controlled Study. *A. J. Ball, T. W. Carr, W. A. Gillespie, M. Kelly, R. A. Simpson and P. J. B. Smith* 491
- Bladder Replacement After Cystoprostatectomy: Efforts to Achieve Total Continence. *P. K. Reddy, P. H. Lange and E. E. Fraley* (Editorial Comment by G. Lieskovsky) 495
- Painful Bladder Disease: Clinical and Pathoanatomical Differences in 115 Patients. *M. Holm-Bentzen, F. Jacobsen, B. Nerstrøm, G. Lose, J. K. Kristensen, R. H. Pedersen, T. Krarup, J. Feggetter, P. Bates, R. Barnard, S. Larsen and T. Hald* 500
- Prospective Double-Blind Clinically Controlled Multicenter Trial of Sodium Pentosanpolysulfate in Treatment of Interstitial Cystitis and Related Painful Bladder Disease. *M. Holm-Bentzen, F. Jacobsen, B. Nerstrøm, G. Lose, J. K. Kristensen, R. H. Pedersen, T. Krarup, J. Feggetter, P. Bates, R. Barnard, S. Larsen and T. Hald* 503
- Treatment of Ulcer and Nonulcer Interstitial Cystitis With Sodium Pentosanpolysulfate: Multicenter Trial. *Å. Fritjofsson, M. Fall, R. Juhlin, B. E. Persson and M. Ruutu* 508
- Successful Therapy of Interstitial Cystitis With Pentosanpolysulfate. *C. L. Parsons and S. G. Mulholland* 513
- Female Urethral Obstruction After Marshall-Marchetti-Krantz Operation. *P. E. Zimmern, H. R. Hadley, G. E. Leach and S. Raz* 517
- Surgical Management of Total Urinary Incontinence in Female Patient. *T. D. Allen* 521
- Experience With Pubovaginal Slings for Urinary Incontinence at University of Michigan. *E. J. McGuire, C. J. Bennett, J. A. Konnak, L. P. Sonda and J. A. Savastano* 525
- Pubovaginal Sling Procedure for Management of Urinary Incontinence After Urethral Trauma in Women. *J. R. Woodside* (Editorial Comments by E. J. McGuire and C. A. Olsson) 527
- Incontinence After Artificial Urinary Sphincter Placement: Role of Perfusion Sphincterometry. *G. E. Leach* (Editorial Comment by D. M. Barrett) 529
- Quantitation of Corporeal Venous Outflow Resistance in Man by Corporeal Pressure Flow Evaluation. *D. H. Freidenberg, R. E. Berger, D. E. Chew, R. Ireton, J. S. Ansell and A. N. Schwartz* 533
- Vasoactive Intracavernous Pharmacotherapy for Treatment of Erectile Impotence in Men With Spinal Cord Injury. *A. A. Sidi, J. S. Cameron, D. D. Dykstra, Y. Reinberg and P. H. Lange* 539
- Prostate Shape, External Striated Urethral Sphincter and Radical Prostatectomy: Apical Dissection. *R. P. Myers, J. R. Goellner and D. R. Cahill* 543
- Use of Fine Needle Aspiration for Detection of Stage A Prostatic Carcinoma Before Transurethral Resection of Prostate: Clinical Trial. *E. H. Agatstein, F. J. Hernandez, L. J. Layfield, R. B. Smith and J. B. deKernion* 551
- Value of Retrograde Pyelography for Fractionally Visualized Upper Tracts on Excretory Urography in Evaluation of Hematuria. *D. Corrie and I. M. Thompson* (Editorial Comments by L. Persky and H. M. Pollack) 554
- Effect of Some Urinary Stone Inhibitors on Membrane Interaction Potentials of Stone Crystals. *N. S. Mandel, G. S. Mandel and A. T. Hasegawa* 557
- New Generation Shock Wave Lithotripsy. *D. M. Wilbert, H. Reichenberger, E. Noske, H. Riedmiller, P. Alken and R. Hohenfellner* 563

Urologists at Work

- Ureteral Meatotomy by Sachse Urethrotome in Management of Lower Ureteral Stones. *M. G. Donovan, J. Hegarty, J. M. Fitzpatrick and M. Butler* 566
- No-Incision Pubovaginal Suspension for Stress Incontinence. *R. F. Gittes and K. R. Loughlin* 568

Urological Neurology and Urodynamics

- Compliance Studies, Pressure Flow Measurements and Renal Function Assessment in Patients With Upper Urinary Tract Dilatation. *D. A. Jones, E. W. Lupton, N. J. R. George, P. Sambrook and R. J. Barnard* (Editorial Comments by R. H. Whitaker and S. A. Koff) 571
- Post-Prostatectomy Incontinence: Influence of Bladder Dysfunction. *G. E. Leach, C.-M. Yip and B. J. Donovan* 574

Pediatric Articles

- Intestincystoplasty and Total Bladder Replacement in Children and Young Adults: Followup in 129 Cases. *M. E. Mitchell and J. A. Piser* 579
- Incomplete Epispadiac Urethral Duplication With Dorsal Penile Curvature. *S. K. Sharma, R. Kapoor, A. Kumar and A. K. Mandal* 585
- Ontogeny of Gonadotropin Secretion in Congenital Anorchism: Sexual Dimorphism Versus Syndrome of Gonadal Dysgenesis and Diagnostic Considerations. *R. H. Lustig, F. A. Conte, B. A. Kogan and M. M. Grumbach* 587
- Urological Complications of Sickle Cell Disease in Pediatric Population. *W. F. Tarry, J. W. Duckett, Jr. and H. McC. Snyder, III* 592

Editorials

- Interstitial Cystitis. *P. M. Hanno and A. J. Wein* 595
- Modest Proposal for Diagnosis and Treatment of Urinary Incontinence in Women. *J. G. Blaivas* 597

Case Reports

- Ureteropelvic Junction Obstruction After Percutaneous Nephrolithotripsy. *D. F. Green, B. Lytton and M. Glickman* 599
- Renal Adenocarcinoma and End Stage Kidney Disease. *M. Boileau, R. Foley, S. Flechner and E. Weinman* (Editorial Comment by L. M. Zinman) 603
- Management of Locally Recurrent Renal Cell Carcinoma After Partial Nephrectomy. *A. C. Novick and R. A. Straffon* (Editorial Comment by D. G. Skinner) 607
- Diagnosis and Management of Massive Gastrointestinal Bleeding Owing to Duodenal Metastasis From Renal Cell Carcinoma. *A. Lynch-Nyhan, E. K. Fishman and S. Kadir* 611
- Barium Granuloma: Unusual Cause of Unilateral Ureteral Obstruction. *J. M. Walther, N. A. Romas and F. C. Lowe* 614
- Enterovesical Fistula Secondary to Mucinous Adenocarcinoma of Appendix. *D. P. Dalton, B. L. Dalkin, S. F. Sener, P. S. Pappas and M. D. Blum* 617
- Cavitary Lung Nodules Associated With Combination Chemotherapy Containing Bleomycin. *J. A. Talcott, M. B. Garnick, P. C. Stomper, J. J. Godleski and J. P. Richie* 619
- Xanthogranulomatous Epididymitis. *L. B. Wiener, P. A. Riehl and N. Baum* 621
- Phylloides Type of Atypical Prostatic Hyperplasia: Report of 3 New Cases. *J. H. Reese, C. M. Lombard, K. Krone and T. A. Stamey* 623
- Unusual Urological Presentations of Acquired Immune Deficiency Syndrome: Large Cell Lymphoma. *J. L. Mohler, J. P. Jarow and F. F. Marshall* (Editorial Comment by J. N. Krieger) 627

Letters to the Editor

- Extracorporeal Shock Wave Lithotripsy and Blood Clotting Defects. *G. Economacos, S. Loukas, D. Mantzouratos and C. Dimopoulos* 630
- Osbon Erec Aid. *P. W. Nadig* 630
- Re: Penile Neuropathy in Insulin-Dependent Diabetes Mellitus, by J. T. Lin and W. E. Bradley. *F. Fanciullacci* 630

INVESTIGATIVE UROLOGY

- Uropathogenicity in Rats and Mice of *Providencia stuartii* From Long-Term Catheterized Patients. *D. E. Johnson, C. V. Lockett, M. Hall-Craigs, H. L. T. Mobley and J. W. Warren* 632
- Identification of "Tumor-Associated" Nucleolar Antigens in Human Urothelial Cancer. *D. Yu, T. Pietro, S. Jurco and P. T. Scardino* 636
- Calcium Oxalate Crystal Interaction With Rat Renal Inner Papillary Collecting Tubule Cells. *J. H. Wiessner, J. G. Kleinman, S. S. Blumenthal, J. C. Garancis, G. S. Mandel and N. S. Mandel* 640
- Fluoride Concentrations in Collection of Urinary Calculi. *M. A. E. Wandt and A. L. Rodgers* 644
- Effects of Interferons on Activity of α -Glycerolphosphate Dehydrogenase in Benign Prostatic Hyperplasia Cells in Primary Culture. *S. Hayward, S. Cox, I. Mitchell, R. Hallows, N. Deshpande and J. Towler* .. 648
- Calcium Channel Blockade and Contractile Responses in Isolated Human Vas Deferens. *M. Fovaeus, K.-E. Andersson and H. Hedlund* 654
- Coexistence of Fast and Slow Myosin Isozymes in Human External Urethral Sphincter. Preliminary Report. *S. Tokunaka, U. Murakami, H. Fujii, K. Okamura, M. Miyata, H. Hashimoto and S. Yachiku* . 659
- Canine Model for Hemodynamic Study of Isolated Corpus Cavernosum. *Y. Vardi and M. B. Siroky* 663
- Comparison of Calcium Antagonist Properties of Antispasmodic Agents. *S. B. Malkowicz, A. J. Wein, M. R. Ruggieri and R. M. Levin* 667
- Bladder Vasodilatation and Release of Vasoactive Intestinal Polypeptide From Urinary Bladder of Cat in Response to Pelvic Nerve Stimulation. *P. O. Andersson, S. R. Bloom, A. Mattiasson and B. Uvelius* ... 671
- Experimental Partial Ureteric Obstruction: Pathophysiological Changes in Upper Tract Pressures and Renal Blood Flow. *P. C. Ryan, K. P. Maher, B. Murphy, G. D. Hurley and J. M. Fitzpatrick* 674

UROLOGICAL SURVEY

- Author Index to Abstracts 680

Nosocomial Pneumonias in Community Teaching Hospital. <i>D. S. Pratt, L. Stallones, N. Johnson, L. Chiarello and J. J. May</i>	681
Lack of Association Between Bacteriuria and Symptoms in Elderly. <i>J. A. Boscia, W. D. Kobasa, E. Abrutyn, M. E. Levison, A. M. Kaplan and D. Kaye</i>	681
Single-Dose Treatment of Bacteriuria in Pregnancy. <i>I. R. McFadyen, M. Campbell-Brown, M. Stephenson and D. V. Seal</i>	681
Epidemiology of Urinary Tract Infections. <i>H. A. Valkenburg</i>	681
Tissue Injury in Inflammation. Oxidants, Proteinases, and Cationic Proteins. <i>P. M. Henson and R. B. Johnston, Jr.</i>	682
Optimal Duration of Treatment of Urinary Tract Infections. <i>S. A. Lerner</i>	682
Spectrum of Bacterial Pathogens in Uncomplicated and Complicated Urinary Tract Infections. <i>A. Bauernfeind, K. Naber and D. Sauerwein</i>	683
Microbiological Aspects of Chemotherapy of Lower Urinary Tract Infections. <i>R. Gómez-Lus and M. C. Rubio Calvo</i>	683
Lower Urinary Tract Infection: Rationale and Efficacy of Single-Dose Antibacterial Therapy. <i>J. D. Williams</i>	683
Cost-Effectiveness Analysis of Single-Dose Therapy of Urinary Tract Infection Compared to Conventional Treatment. <i>K. J. Carlson</i>	684
Bacterial Resistance and Single-Dose Therapy of Urinary Tract Infections. <i>G. Satta, M. Caredda, M. Pruna and R. Pompei</i>	684
Bacterial Host Interaction in Pathogenesis and Management of Lower Urinary Tract Infection. <i>E. Bergogne-Bérézin</i>	684
Microbiological and Pharmacokinetic Profile of Antibacterial Agent Useful for Single-Dose Therapy of Urinary Tract Infection. <i>R. Slack and D. Greenwood</i>	684
Single-Dose Therapy of Urinary Tract Infections in Infants and Children. <i>J. P. Guggenbichler and W. Sperl</i>	685
Prospective Study of Intravesical Dimethyl Sulfoxide in Treatment of Chronic Inflammatory Bladder Disease. <i>S. B. Barker, P. N. Matthews, P. F. Philip and G. Williams</i>	685
Small Adrenocortical Carcinoma With Aggressive Behavior: Evaluation of Criteria for Malignancy. <i>M. J. Gandour and W. E. Grizzle</i>	685
Diagnosis and Prognosis of Adrenocortical Neoplasms. <i>D. L. Page, A. J. Hough, Jr. and G. F. Gray, Jr.</i> ..	685
Epithelioid Sarcoma. <i>C. P. Karakousis</i>	686
Adenocarcinoma With Neuroendocrine Differentiation of Urinary Bladder: Clinicopathologic, Immunohistochemical, and Ultrastructural Study. <i>P. Abenzoza, C. Manivel and R. K. Sibley</i>	686
Are Biopsies From Prostatic Urethra Useful in Patients With Superficial Bladder Carcinoma?. <i>C. H. M. Rikken, P. J. R. O. Van Helsdingen and B. A. Kazzaz</i>	686
Pure Small-Cell Carcinoma of Prostate With Fatal Liver Metastasis. <i>J. C. Bleichner, B. Chun and R. S. Klappenbach</i>	686
Mediastinal Teratoma Associated With Klinefelter's Syndrome. <i>M. F. Lachman, K. Kim and B.-C. Koo</i> ...	686
Asymptomatic Hyperuricemia. Risks and Consequences in Normative Aging Study. <i>E. W. Campion, R. J. Glynn and L. O. DeLabry</i>	686
Surgical Treatment of Occlusion of Infrarenal Abdominal Aorta. <i>P. Ketonan, P.-T. Harjola, K. Ala-Kulju, T. Mattila, R. Luosto and K. Verkkala</i>	687
Hepatorenal Syndrome. Studies of Effect of Vascular Volume and Intraperitoneal Pressure on Renal and Hepatic Function. <i>R. Cade, H. Wagemaker, S. Vogel, D. Mars, D. Hood-Lewis, M. Privette, J. Peterson, E. Schlein, R. Hawkins, D. Raulerson and K. Campbell</i>	687
Renal Hemodynamic Effects of Calcium Antagonists. <i>R. D. Loutzenhisser and M. Epstein</i>	687
Penetrating Abdominal Trauma: Resuscitation, Diagnostic Evaluation, and Definitive Management. <i>S. E. Briggs, D. Hendricks and L. M. Flint, Jr.</i>	688
Long-Term Survival in Haemodialysis Patients. <i>J. R. Bradley, D. B. Evans and R. Calne</i>	688
Adverse Effects of Cyclosporine A on Microcirculation of Cold Preserved Kidney. <i>D. Anaise, W. C. Waltzer, A. N. Arnold and F. T. Rapaport</i>	688
Surgical Treatment of Radiation Injury to Rectosigmoid. <i>H. Harling and I. Balslev</i>	689
New Methods of Percutaneous Gastrostomy Using Anchoring Devices. <i>T. K. Wu, D. Pietrocola and H. Welch</i>	689
Our Experience in Application of Biocompatible Indwelling Ureteral Stents. <i>N. Minkov, G. Gotsev and N. Naumov</i>	689
Indwelling Urinary Catheters in Elderly. Relation of "Catheter Life" to Formation of Encrustations in Patients With and Without Blocked Catheters. <i>C. M. Kunin, Q. F. Chin and S. Chambers</i>	689
Assessment of Immediate and Long-Term Effects of Pharmacologically Induced Penile Erections in Treatment of Psychogenic and Organic Impotence. <i>E. A. Kiely, G. Williams and L. Goldie</i>	690
Priapism in Patients Treated With Total Parenteral Nutrition. <i>B. Ekström and A. M. Olsson</i>	690
Immunology of Semen. <i>N. J. Alexander and D. J. Anderson</i>	690
Double-Blind, Placebo-Controlled Study of Use of Methylprednisolone in Infertile Men With Sperm-Associated Immunoglobulins. <i>G. G. Haas, Jr. and P. Managiello</i>	691
Dibromochloropropane (DBCP): 8-Year Reevaluation of Testicular Function and Reproductive Performance. <i>G. Potashnik and I. Yanai-Inbar</i>	691
Renal Mass Imaging: Internist's Role. <i>J. J. Cronan and R. K. Zeman</i>	691
Safe Jugular and Subclavian Venipuncture Under Ultrasonographic Guidance. <i>J. Machi, J. Takeda and J. Kakegawa</i>	692

Prorenin as Reproductive Hormone. New Form of Renin System. <i>J. E. Sealey, N. Glorioso, J. Itskovitz and J. H. Laragh</i>	692
Urinary Calcium Excretion in Nonfamilial Hyperparathyroidism. <i>M. Las and U. S. Barzel</i>	692
Focal Adrenocortical Cytomegaly Observed in Two Adult Cases. <i>M. Yamashina</i>	693
Haematuria Following Marathon Run: Source and Significance. <i>R. I. Reid, D. H. Hosking and E. W. Ramsey</i>	693
Indoor Air Pollution. <i>L. E. Hinkle, Jr.</i>	693
Clinics in Geriatric Medicine. Urinary Incontinence, by <i>J. G. Ouslander</i> . <i>P. M. Hanno</i>	693
Surgical Pathology of Urologic Diseases, by <i>N. Javadpour and S. H. Barsky</i> . <i>J. E. Pontes</i>	694
Radiologic Clinics of North America: Interventional Uroradiology, by <i>E. K. Lang</i> . <i>G. D. Frentz</i>	694
Current Literature	695

NUMBER 4, PART 1, OCTOBER

CLINICAL UROLOGY**Original Articles**

Percutaneous Renal Calculus Removal in Extracorporeal Shock Wave Lithotripsy Practice. <i>A. J. LeRoy, J. W. Segura, H. J. Williams, Jr. and D. E. Patterson</i>	703
Extracorporeal Shock Wave Lithotripsy of Caliceal Diverticula Calculi. <i>K. E. Psihramis and S. P. Dretler</i>	707
Patient Exposure and Radiation Environment of Extracorporeal Shock Wave Lithotripsy System. <i>P.-J. P. Lin and A. F. Hrejsa</i>	712
Radiation Dose to Patient and Personnel During Extracorporeal Shock Wave Lithotripsy. <i>W. H. Bush, D. Jones and R. P. Gibbons</i>	716
Management of Upper Ureteral Calculi With Extracorporeal Shock Wave Lithotripsy. <i>J. E. Lingeman, W. L. Shirrell, D. M. Newman, P. G. Mosbaugh, R. E. Steele and J. R. Woods</i>	720
Percutaneous Ureteral Fulguration: Nonsurgical Technique for Ureteral Occlusion. <i>P. K. Reddy, L. Moore, D. Hunter and K. Amplatz</i>	724
Occurrence of Vasculitis in Perianeurysmal Fibrosis. <i>O. I. Lindell, H. V. Sariola and T. A. Lehtonen</i> (Editorial Comment by <i>W. M. Murphy</i>)	727
Remodeled Right Colon: Alternative Urinary Reservoir. <i>J. L. Lockhart</i>	730
Effect of Liquid Diphenoxylate Hydrochloride and Atropine Sulfate (Lomotil) Instillations on Dynamics and Function of Continent Cecal Urinary Reservoirs. <i>J. E. Fowler, Jr., M. Clayton, K. Mouli and G. Reagan</i>	735
Functional Characteristics of Camey Ileal Bladder. <i>C. G. Roehrborn, C. M. Teigland and A. I. Sagalowsky</i> ..	739
Features of 164 Bladder Ruptures. <i>A. S. Cass and M. Luxenberg</i>	743
Mast Cell Involvement in Interstitial Cystitis. <i>W. L. Lynes, S. D. Flynn, L. D. Shortliffe, M. Lemmers, R. Zipser, L. J. Roberts, II and T. A. Stamey</i>	746
Correlation of Histopathological, Cytological and Flow Cytometric Findings in Neoplastic and Nonneoplastic Lesions of Bladder. <i>D. F. Cowan, B. Wu, G. P. Young and O. P. Khanna</i> (Editorial Comments by <i>H. W. Herr and J. M. Kozlowski</i>)	753
Influence of Blood Group Type on Natural History of Superficial Bladder Cancer. <i>E. Orihuela and R. S. Shahon</i>	758
Monitoring Endoscopic Treatment of Superficial Bladder Carcinoma by Postoperative Urinary Cytology. <i>R. A. Badalament, H. Gay, E. S. Cibas, H. W. Herr, W. F. Whitmore, Jr., W. R. Fair and M. R. Melamed</i> ..	760
Monitoring Intravesical Bacillus Calmette-Guerin Treatment of Superficial Bladder Carcinoma by Postoperative Urinary Cytology. <i>R. A. Badalament, H. Gay, E. S. Cibas, H. W. Herr, W. F. Whitmore, Jr., W. R. Fair and M. R. Melamed</i>	763
Outcome of Conservative Treatment of Carcinoma In Situ of Bladder. <i>G. R. Prout, Jr., P. P. Griffin and J. J. Daly</i>	766
Transcystoscopic Intracavitary Irradiation for Carcinoma of Bladder: Technique and Preliminary Clinical Results. <i>T. Harada, S. Tsuchida, O. Nishizawa, T. Kigure, H. Noto, T. Kumazaki and T. Kato</i> (Editorial Comment by <i>W. U. Shipley</i>)	771
Epithelium in Female Urethra: Quantitative Study. <i>A. Carlile, I. Davies, E. Faragher and J. C. Brocklehurst</i>	775
Artificial Urinary Sphincter for Recurrent Female Urinary Incontinence: Indications and Results. <i>A. C. Diokno, J. B. Hollander and T. P. Alderson</i> (Editorial Comment by <i>D. M. Barrett</i>)	778
Psychometric Differentiation of Psychogenic and Organic Erectile Disorders. <i>J. P. Hatch, A. M. de la Peña and J. G. Fisher</i>	781
Spongiosolysis: New Surgical Treatment of Impotence Caused by Distal Venous Leakage. <i>P. Gilbert and C. Stief</i>	784
Detection of Testicular Neoplasms by Cytological Examination of Seminal Fluid. <i>M. Czaplicki, J. Rojewska, R. Pykalo and K. Szymanska</i> (Editorial Comment by <i>R. G. Rowland</i>)	787
Cyclophosphamide and Sequential Cisplatin for Advanced Seminoma: Long-Term Followup in 52 Patients. <i>C. J. Logothetis, M. L. Samuels, S. L. Ogden, F. H. Dexeus and C. D.-K. Chong</i>	789
Vasectomy and Risk of Prostatic Cancer and Benign Prostatic Hypertrophy. <i>S. Sidney</i>	795
Cytological Grading of Prostatic Aspiration Biopsy: Comparison With Gleason Grading System. <i>L. J. Layfield, E. Mukamel, L. H. Hilborne, J. B. Hannah, B. J. Glasgow, B.-M. Ljung and J. B. deKernion</i> ..	798

Hormonal Effects of Cessation of Estrogen Treatment for Prostatic Carcinoma. <i>R. Tomić and B. Bergman</i>	801
Flutamide Eliminates Risk of Disease Flare in Prostatic Cancer Patients Treated With Luteinizing Hormone-Releasing Hormone Agonist. <i>F. Labrie, A. Dupont, A. Belanger and R. Lachance</i>	804
Bladder Neck Resection and Transurethral Resection of Prostate: Randomized Prospective Trial. <i>M. K. Li and A. S. M. Ng</i>	807
Transurethral Incision of Prostate Compared With Transurethral Resection of Prostate in 132 Matching Cases. <i>A. Orandi</i>	810
Surgical Treatment of Locally Advanced (T3) Prostatic Carcinoma: Early Results. <i>R. J. L. H. Bosch, K. H. Kurth and F. H. Schroeder</i> (Editorial Comment by R. P. Gibbons)	816
Potency Following Radical Prostatectomy With Wide Unilateral Excision of Neurovascular Bundle. <i>P. C. Walsh, J. I. Epstein and F. C. Lowe</i>	823
Concentration of Pefloxacin in Split Ejaculates of Patients With Chronic Male Accessory Gland Infection. <i>F. H. Comhaire</i>	828
Urologists at Work	
Technique for Stenting Tortuous Ureters. <i>K. S. Fraser</i> (Editorial Comment by R. V. Clayman)	831
Urological Neurology and Urodynamics	
Urodynamic Evaluation of Patients After Camey Operation. <i>B. Goldwasser, C. C. Rife, R. C. Benson, Jr., W. L. Furlow and D. M. Barrett</i>	832
Urodynamic Findings in Parkinson's Disease. <i>Y. Berger, J. G. Blauvas, E. R. DeLaRocha and J. M. Salinas</i>	836
Pediatric Articles	
Initial Experience With Extracorporeal Shock Wave Lithotripsy in Children. <i>M. Sigman, V. P. Laudone, A. D. Jenkins, S. S. Howards, R. Riehle, Jr., M. A. Keating and R. D. Walker</i>	839
Hypertension Induced by Occult Renal Tissue. <i>S. K. Fernbach, E. A. Holland, I. Benuck and S. Young</i>	842
Radionuclide Renography to Evaluate Urodynamically Expected Upper Tract Obstruction in Patients With Meningomyelocele. <i>W. Zwiers, M. F. van Driel, B. J. de Ruiter, H. Beekhuis, B. A. Piers and M. C. de Jonge</i> (Editorial Comment by E. J. McGuire)	845
Rehabilitation of Dysfunctional Bladder in Children: Method and 3-Year Followup. <i>A.-L. Hellström, K. Hjälmsås and U. Jodal</i>	847
Editorials	
Radiation Exposure and Extracorporeal Shock Wave Lithotripsy. <i>H. M. Pollack</i>	850
Bladder Replacement. <i>J. K. Light</i>	851
Transurethral Incision or Resection of Prostate. <i>W. K. Mebust</i>	852
Case Reports	
Renal Capsular Leiomyoma. <i>J. L. Mohler and A. J. Casale</i>	853
Ileocecostoplasty Bladder Augmentation and Renal Transplantation. <i>M. G. Barnett, R. C. Bruskevitz, F. O. Belzer, H. W. Sollinger and D. T. Uehling</i>	855
Adenocarcinoma in Ileal Conduit: Late Recurrence of Urethral Adenocarcinoma. <i>S. Meretyk, E. H. Landau, E. Okon, M. Ligumsky and A. Shapiro</i>	859
Squamous Cell Carcinoma in Young Circumcised Man. <i>B. J. Rogus</i>	861
Ultrasound of Polyorchidism: Case Report and Literature Review. <i>V. L. Giyanani, J. McCarthy, D. D. Venable, J. Terkeurst and M. Fowler</i>	863

INVESTIGATIVE UROLOGY

This Month in Investigative Urology: Re: Monocyte Cytolytic Factor in Promoting Monocyte-Mediated Lysis of Bladder Cancer Cells by Bacillus Calmette-Guerin. <i>W. J. Catalona</i>	866
Monocyte Cytolytic Factor in Promoting Monocyte-Mediated Lysis of Bladder Cancer Cells by Bacillus Calmette-Guerin. <i>K. Nakamura, J. W. Chiao, G. R. Nagamatsu and J. C. Addonizio</i>	867
Role of Vasoactive Intestinal Polypeptide as Neurotransmitter in Canine Penile Erection: Combined In Vivo and Immunohistochemical Study. <i>K.-P. Juenemann, T. F. Lue, J.-A. Luo, S. A. Jadallah, L. L. Nunes and E. A. Tanagho</i>	871
Unilateral Testicular Disease: Effect on Contralateral Testis (Morphometric Study). <i>G. Janetschek, R. Heilbronner, W. Schachtner, H. P. Rohr, G. Mikuz and G. Bartsch</i>	878
Immunohistochemical Localization of Prostatic Secretory Protein of 94 Amino Acids in Normal Prostatic Tissue, in Primary Prostatic Tumors and in Their Metastases. <i>J. Y. Dubé, G. Pelletier, P. Gagnon and R. R. Tremblay</i>	883
Neuropeptide Y- and Vasoactive Intestinal Polypeptide-Containing Nerves in Intrinsic External Urethral Sphincter in Areflexic Bladder Compared to Detrusor-Sphincter Dyssynergia in Patients With Spinal Cord Injury. <i>P. Milner, R. Crowe, G. Burnstock and J. K. Light</i>	888
Urothelial Injury to Rabbit Bladder From Alkaline Irrigants Useful in Treatment of Uric Acid Stones. <i>C. E. Chernesky, J. S. Rodman, J. Reckler, H. Rotterdam, D. Marion, J. Boolbol and E. D. Vaughan, Jr.</i>	893
Antisperm Antibodies Bind With Different Patterns to Sperm of Different Men. <i>W. J. G. Hellstrom, J. W. Overstreet, S. M. Moore, S. J. Samuels, R. J. Chang and E. L. Lewis</i>	895
Formation of Encrustations on Indwelling Urinary Catheters in Elderly: Comparison of Different Types of Catheter Materials in 'Blockers' and 'Nonblockers'. <i>C. M. Kunin, Q. F. Chin and S. Chambers</i>	899

Proteins of Rat Prostate. II. Synthesis of New Proteins in Ventral Lobe During Castration-Induced Regression. <i>C. Lee and J. A. Sensibar</i>	903
Partial Dependency of Human Prostatic Growth Factor on Steroid Hormones in Stimulating Thymidine Incorporation Into DNA. <i>M. T. Hierowski, M. W. McDonald, L. Dunn and J. W. Sullivan</i>	909
In Vitro Comparison of Properties of Polydioxanone, Polyglycolic Acid and Catgut Sutures in Sterile and Infected Urine. <i>A. El-Mahrouky, J. McElhaney, F. F. Bartone and L. King</i>	913
Investigative Grammar.	916

UROLOGICAL SURVEY

Author Index to Abstracts	918
Diagnosis of Interstitial Cystitis. <i>E. M. Messing</i>	919
Pathology and Pathogenesis of Interstitial Cystitis. <i>M. Holm-Bentzen and G. Lose</i>	919
Urodynamic Studies in Interstitial Cystitis. <i>R. Perez-Marrero, L. Emerson and S. Juma</i>	920
Sodium Pentosanpolysulfate Treatment of Interstitial Cystitis: Update. <i>C. L. Parsons</i>	920
Treatment of Interstitial Cystitis With Neodymium:YAG Laser. <i>A. M. Shanberg and T. Malloy</i>	920
Intravesical 50% Dimethyl Sulfoxide (Rimso-50) in Treatment of Interstitial Cystitis. <i>G. R. Sant</i>	920
Medical Treatment of Interstitial Cystitis (Other Than Rimso-50/Elmiron). <i>P. H. Hanno and A. J. Wein</i> ..	921
Characterization of Bacterial and Nonbacterial Prostatitis by Prostatic Immunoglobulins. <i>L. M. D. Shortliffe and N. Wehner</i>	921
Role of Oral Acyclovir in Management of Genital Herpes Simplex. <i>S. L. Sacks</i>	922
Diagnosis of Bacteriuria in Men: Specimen Collection and Culture Interpretation. <i>B. A. Lipsky, R. C. Ireton, S. D. Fihn, R. Hackett and R. E. Berger</i>	922
Periurethral Enterobacterial Carriage Preceding Urinary Infection. <i>W. Brumfitt, R. A. Gargan and J. M. T. Hamilton-Miller</i>	922
Antibiotic Prophylaxis of 1,036 Patients Undergoing Elective Surgical Procedures. Prospective, Randomized Comparative Trial of Cefazolin, Cefoxitin, and Cefotaxime in Prepaid Medical Practice. <i>R. N. Jones, W. Wojeski, J. Bakke, C. Porter and M. Searles</i>	923
Intracaval Extension of Pheochromocytoma Simulating Pulmonary Embolism. <i>T. E. Dicke, M. L. Henry and J. P. Minton</i>	923
Solitary Pulmonary Metastasis: Enigma. <i>M. Salsali</i>	923
Diagnosis of Pulmonary Nodules in Cancer Patient: Role for Routine Culture and Unusual Application of Human Tumor Colony-Forming Assay. <i>H. M. Friedman, M. Johnston, A. M. Macher and D. Glaubiger</i>	923
Surgical Treatment of Bilateral Synchronous Wilms' Tumors. <i>K. A. Hanash, K. Sackey, R. S. Sabbah, M. Akhtar, R. J. A. Aur and A. M. Ali</i>	924
Secondary Urinoma Mimicking Recurrent Tumor as Cause of Bilateral Ureteral Obstruction. <i>T. A. Zein, R. P. Huben, N. J. Petrelli, S. Reid and J. E. Pontes</i>	924
Indolent Lymphadenopathic Kaposi's Sarcoma. <i>R. A. Schwartz, L. D. Brenden, J. H. Breeden and W. C. Lambert</i>	924
Liposarcoma of Spermatic Cord: Case Report and Review of Literature. <i>M. H. Torosian and A. J. Wein</i> ...	924
Leiomyosarcoma of Scrotum. <i>D. St. J. Collier, J. A. Pain and S. J. Hamilton-Dutoit</i>	925
Diagnostic Imaging of Human Neuroblastoma With Radiolabeled Antibody. <i>F. D. Miraldi, A. D. Nelson, C. Kraly, S. Ellery, B. Landmeier, P. F. Coccia, S. E. Strandjord and N.-K. V. Cheung</i>	925
Tumor Stabilization After Hyperthermia: Important Criterion of Response to Thermal Therapy. <i>F. K. Storm, E. F. Scanlon, H. W. Baker, D. Roe and D. L. Morton</i>	925
Use of ⁹⁰ Sr Applicator for Intraoperative Radiation Therapy in Mouse Tumor Model. <i>H. Z. Hill, M. Ohanian, G. J. Hill and R. Winne</i>	926
Stone Formation in Human Kidney. <i>F. Hering, Th. Briellmann, G. Lüönd, H. Guggenheim, H. Seiler and G. Rutishauser</i>	926
Detection of Crystallization Inhibitory Activity of Whole Urine With Gel Model. <i>M. K. Li, D. K. Y. Shum and S. Choi</i>	926
Inhibition of Calcium Oxalate Crystallization in Urine. <i>H. G. Tiselius, A. M. Fornander and M. A. Nilsson</i>	927
Experimental Determination of Kinetics of Calcium-Binding With Chondroitin Sulphate and Effects of Uric Acid on This Process. <i>A. Hesse, H. Wurzel, G. Krampitz and W. Vahlensieck</i>	927
Sodium is Neither Risk nor Protective Factor in Urolithiasis? <i>P. P. Singh, A. K. Pendse, P. Hada, P. C. Nagori, V. Rathore and P. K. Dashora</i>	927
Extracorporeal Shock Wave Lithotripsy: Interventional Radiologic Solutions to Associated Problems. <i>C. J. Tegtmeyer, C. D. Kellum, A. Jenkins, J. Y. Gillenwater, W. G. Way, J. Barr, G. Piros, R. Springer, M. C. Lippert and A. W. Wyker</i>	927
Renal Allograft Rejection: US Evaluation. <i>W. Hoddick, R. A. Filly, U. Backman, P. W. Callen, F. Vincenti, H. Hricak, B. S. Mahony and W. Amend</i>	928
Infectious Complications With Use of Cyclosporine Versus Azathioprine After Cadaveric Kidney Transplantation. <i>D. Shaffer, S. M. Hammer and A. P. Monaco</i>	928
Technique of Simultaneous Renal Pancreatoduodenal Transplantation With Urinary Drainage of Pancreatic Secretion. <i>D. D. Nghiem and R. J. Corry</i>	929
Imaging of Kock Continent Ileal Urinary Reservoir. <i>P. W. Ralls, J. A. Barakos, D. G. Skinner, W. D. Boswell, Jr., D. R. Radin, P. M. Colletti and J. M. Halls</i>	929

New Super-Stiff Guide Wire. <i>T. P. Smith, M. D. Darcy, D. W. Hunter, W. R. Castaneda-Zuniga and K. Amplatz</i>	930
Urine-Compatible Polymer for Long-Term Ureteral Stenting. <i>J. F. Cardella, W. R. Castaneda-Zuniga, D. W. Hunter, J. C. Hulbert and K. Amplatz</i>	930
Cryopreservation of Human Spermatozoa. I. Effects of Holding Procedure and Seeding on Motility, Fertilizability, and Acrosome Reaction. <i>J. K. Critser, A. R. Huse-Benda, D. V. Aaker, B. W. Arneson and G. D. Ball</i>	931
Importance of Sperm Motility After Capacitation in Interpreting Hamster Ovum Sperm Penetration Assay. <i>D. B. P. J. van Duren, H. M. Vemer, B. L. A. Bastiaans, W. H. Doesburg, W. N. P. Willemsen and R. Rolland</i>	931
Use of Sperm Penetration Assay in Evaluation of Men With Varicocele. <i>S. R. Plymate, R. R. Nagao, C. H. Muller and C. A. Paulsen</i>	931
Interrelationships of Cigarette Smoking, Testicular Varicoceles, and Seminal Fluid Indexes. <i>E. L. Klaiber, D. M. Broverman, T. B. Pokoly, A. J. Albert, P. J. Howard, Jr. and J. F. Sherer</i>	932
Percutaneous Spermatic Vein Occlusion: Evaluation of Sclerosing Agents in Experimental Animals. <i>M. L. Kinnison, S. Kadir, J. D. Strandberg, J. H. Anderson and R. I. White, Jr.</i>	932
Treatment of Idiopathic Hypogonadotropic Hypogonadism in Men With Luteinizing Hormone-Releasing Hormone: Comparison of Treatment With Daily Injections and With Pulsatile Infusion Pump. <i>A. A. Shargil</i>	932
20-Year Experience With Epididymovasostomy for Pathologic Epididymal Obstruction. <i>H. Y. Lee</i>	933
Age-Related Changes in Contractile Force of Rabbit Detrusor Muscle to Prostaglandin E ₁ , E ₂ and F ₂ . <i>T. Morita, M. A. Wheeler and R. M. Weiss</i>	933
Clinical Research in Era of Cost Containment. <i>F. G. Moody</i>	933
Pediatric Nephrology, 2nd Edition, by M. A. Holliday, T. M. Barratt and R. L. Vernier. <i>L. R. King</i>	933
Practical Aspects of Gynaecourology, by A. Tankó, I. Berbik and E. Petri. <i>E. J. Zeidman and S. Raz</i>	934
Current Literature	935

NUMBER 4. PART 2. OCTOBER

Reflux

Nonsurgical Approach to Management of Primary Vesicoureteral Reflux. <i>S. J. Skoog, A. B. Belman and M. Majd</i>	941
Detrusorrrhaphy: Extravesical Ureteral Advancement to Correct Vesicoureteral Reflux in Children. <i>M. R. Zaontz, M. Maizels, E. C. Sugar and C. F. Firlit</i>	947
Endoscopic Treatment of Vesicoureteral Reflux in Children. <i>C. C. Schulman, J. Simon, D. Pamart and F. E. Avni</i> (Editorial Comment by J. R. Woodard)	950
Endoscopic Correction of Reflux by Polytetrafluoroethylene Injection. <i>W. E. Kaplan, D. P. Dalton and C. F. Firlit</i>	953
Discussion	956

Surgical Techniques

Neodymium:YAG Laser Ablation of Posterior Urethral Valves. <i>R. M. Ehrlich, A. Shanberg and R. S. Fine</i>	959
Dorsal Lumbotomy Incision in Pediatric Urological Surgery. <i>S. M. Orland, H. M. Snyder and J. W. Duckett</i>	963
Discussion	967

Wilms Tumor

Bilateral Wilms Tumor. <i>M. L. Blute, P. P. Kelalis, K. P. Offord, N. Breslow, J. B. Beckwith and G. J. D'Angio</i>	968
Wilms Tumors: Relationship of Nuclear Deoxyribonucleic Acid Ploidy to Patient Survival. <i>L. M. Rainwater, Y. Hosaka, G. M. Farrow, S. A. Kramer, P. P. Kelalis and M. M. Lieber</i>	974
Discussion	978

Research

Alpha ₁ Adrenergic Receptors in Canine Lower Genitourinary Tissues: Insight Into Development and Function. <i>E. Shapiro and H. Lepor</i>	979
Inhibition of Protein Glycosylation Causes Renal Dysplasia in Chick Embryo. <i>J. R. Spencer and M. Maizels</i>	984
Effect of Cyclosporine A on Male Reproduction in Rats. <i>L. Seethalakshmi, M. Menon, R. K. Malhotra and D. A. Diamond</i>	991
Operation to Create Continent Catheterizable Urinary Sphincter From Short Intestinal Segment: Experimental Observations. <i>S. A. Koff, C. Cirulli, S. P. Lucero and A. Hamoudi</i>	996
Discussion	1000

Bladder Augmentation

Experiences With Bladder Reconstruction in Children. <i>L. R. King, G. D. Webster and R. A. Bertram</i>	1002
Cystometric Properties of Ileum and Right Colon After Bladder Augmentation, Substitution or Replacement. <i>B. Goldwasser, D. M. Barrett, G. D. Webster and S. A. Kramer</i>	1007

Gastrocystoplasty and Colocystoplasty in Canines: Metabolic Consequences of Acute Saline and Acid Loading. <i>J. A. Piser, M. E. Mitchell, T. B. Kulb, R. C. Rink, H. A. Kennedy and A. McNulty</i>	1009
Small Bowel Augmentation in Children With Neurogenic Bladder: Initial Report of Urodynamic Findings. <i>R. M. Decter, S. B. Bauer, J. Mandell, A. H. Colodny and A. B. Retik</i>	1014
Discussion	1017
Pediatric Urology Medal	
F. Douglas Stephens: Pioneer in Pathoembryology. <i>L. R. King</i>	1020
Imaging	
Neonatal Renomegaly. <i>H. W. Johnson, M. Gleave, G. U. Coleman, H. R. Nadel, J. Raffel and P. F. Weckworth</i>	1023
Magnetic Resonance Imaging in Genital Anomalies. <i>B. A. Kogan, H. Hricak and E. A. Tanagho</i>	1028
In-Office Ultrasonography to Image Kidneys and Bladder of Children. <i>M. Maizels, M. R. Zaontz, D. L. Houlihan and C. F. Firlit</i>	1031
Discussion	1036
Andrology	
Diagnosis and Surgical Correction of Pediatric Varicocele. <i>C. Reitelman, K. A. Burbige, I. S. Sawczuk and T. W. Hensle</i> (Editorial Comment by A. B. Belman)	1038
Use of Venography as Aid in Varicolectomy. <i>M. R. Zaontz and C. F. Firlit</i>	1041
Long-Term Effect of Luteinizing Hormone-Releasing Hormone Analogue (Buserelin) on Cryptorchid Testes. <i>F. Hadžiselimović, D. Huff, J. Duckett, B. Herzog, J. Elder, H. Snyder and M. Buser</i>	1043
Fertility in Cryptorchidism: Improved Timing of Fixation and Treatment in Experimental Model. <i>B. A. Kogan, R. Gupta and K.-P. Juenemann</i>	1046
Effect of Treatment With Chronic Gonadotropin Releasing Hormone Agonist on Human Testis. <i>F. Hadžiselimović, E. Senn and K. Bandhauer</i> (Editorial Comment by S. S. Howards)	1048
Bilateral Neonatal Torsion. <i>M. P. LaQuaglia, S. B. Bauer, A. Eraklis, N. Feins and J. Mandell</i>	1051
Discussion	1055
Exstrophy–Epispadias–Cloaca	
Use of Anterior Detrusor Tube in Managing Urogenital Sinus Anomalies. <i>D. A. Diamond and P. G. Ransley</i>	1057
Cloacal Exstrophy: Report of 34 Cases. <i>R. S. Hurwitz, G. A. M. Manzoni, P. G. Ransley and F. D. Stephens</i>	1060
Cloacal Exstrophy and Cloacal Exstrophy Variants: Proposed System of Classification. <i>G. A. Manzoni, P. G. Ransley and R. S. Hurwitz</i>	1065
Transverse Island Flap and Double Flap Procedure in Treatment of Congenital Epispadias in 32 Patients. <i>G. Monfort, G. Morisson-LaCombe, J. M. Guys and M. Coquet</i>	1069
Discussion	1072
Genital Reconstruction	
Outpatient Catheterless Modified Mathieu Hypospadias Repair. <i>R. Rabinowitz</i>	1074
Use of Parenteral Testosterone Therapy in Genital Reconstructive Surgery. <i>J. P. Gearhart and R. D. Jeffs</i>	1077
Unified Approach to Early Reconstructive Surgery of Child With Ambiguous Genitalia. <i>J. E. Oesterling, J. P. Gearhart and R. D. Jeffs</i>	1079
Discussion	1083
Report of Committee on Classification, Nomenclature and Terminology	
Renal Dysgenesis and Cystic Disease of Kidney: Report of Committee on Terminology, Nomenclature and Classification, Section on Urology, American Academy of Pediatrics. <i>K. I. Glassberg, F. D. Stephens, R. L. Lebowitz, V. Braren, J. W. Duckett, E. C. Jacobs, L. R. King and A. D. Perlmutter</i>	1085
Urethral Reconstruction	
Bladder Mucosal Graft for Urethral Reconstruction. <i>M. A. Koyle and R. M. Ehrlich</i>	1093
Use of Bladder Mucosa and Combined Bladder Mucosa/Preputial Skin Grafts for Urethral Reconstruction. <i>P. G. Ransley, P. G. Duffy, I. L. Oesch, P. Van Oyen and D. Hoover</i>	1096
Discussion	1099
Infection—Stones	
Epididymitis in Infants and Boys: Underlying Urogenital Anomalies and Efficacy of Imaging Modalities. <i>A. Siegel, H. Snyder and J. W. Duckett</i>	1100
Localization of Bacteriuria in Patients With Enterocystoplasty and Nonrefluxing Conduits. <i>R. Gonzalez and Y. Reinberg</i>	1104
Extracorporeal Shock Wave Lithotripsy in Childhood. <i>R. L. Kroovand, L. H. Harrison and D. L. McCullough</i>	1106
Discussion	1109
Neurogenic Bladder	
Urodynamic Assessment of Children With Cerebral Palsy. <i>R. M. Decter, S. B. Bauer, S. Khoshbin, F. M. Dyro, C. Krarup, A. H. Colodny and A. B. Retik</i>	1110

Biofeedback Training for Children With Bladder Sphincter Incoordination. <i>G. R. Jerkins, H. N. Noe, W. R. Vaughn and E. Roberts</i>	1113
Biological Response of Bladders Rendered Continent by Insertion of Artificial Sphincter. <i>B. M. Churchill, R. F. Gilmour, A. E. Khoury and G. A. McLorie</i>	1116
Comparison of Artificial Sphincter Implantation and Bladder Neck Reconstruction in Patients With Neurogenic Urinary Incontinence. <i>A. A. Sidi, Y. Reinberg and R. Gonzalez</i>	1120
Complications of Artificial Urinary Sphincter Around Intestinal Segments in Reconstructed Exstrophy Patients. <i>K. A. Burbige, C. Reitelman and C. A. Olsson</i>	1123
Discussion	1126

NUMBER 5. NOVEMBER

CLINICAL UROLOGY

Review Article

Paraneoplastic Syndromes Associated With Prostatic Carcinoma. <i>H. Matzkin and Z. Braf</i>	1129
---	------

Original Articles

Adrenal Tumors: Involvement of Inferior Vena Cava. <i>M. L. Ritchey, R. Kinard and D. E. Novicki</i>	1134
Role of Oxalate and Calcium Oxalate Activity and Formation Product Ratio in Patients With Renal Stone Before and During Treatment. <i>J. C. Peña, M. F. Monforte and A. Briceño</i>	1137
Current Role of Pre-Transplant Blood Transfusions and Tissue Typing in Cadaveric Renal Transplantation. <i>M. A. Koyle, J. Rajfer, M. R. Mickey, R. J. Glasscock and H. J. Ward</i>	1141
Prognostic Variables in Patients With Transitional Cell Carcinoma of Renal Pelvis and Proximal Ureter. <i>C. Reitelman, I. S. Sawczuk, C. A. Olsson, P. J. Puchner and M. C. Benson</i>	1144
Conservative Surgery for Transitional Cell Carcinoma of Renal Pelvis. <i>M. Ziegelbaum, A. C. Novick, S. B. Stroom, J. E. Montie, J. E. Pontes and R. A. Straffon</i> (Editorial Comment by M. J. Droller)	1146
Appliance-Free, Sphincter-Controlled Bladder Substitute: Urethral Kock Pouch. <i>M. A. Ghoneim, N. G. Kock, G. Lycke and A. B. S. El-Din</i> (Editorial Comment by D. G. Skinner)	1150
Effect of Nifedipine on Cystoscopy-Induced Autonomic Hyperreflexia in Patients With High Spinal Cord Injuries. <i>D. D. Dykstra, A. A. Sidi and L. C. Anderson</i>	1155
5-Year Experience With Intravesical Therapy of Carcinoma In Situ: Inquiry Into Risks of "Conservative" Management. <i>T. H. Stanisic, J. M. Donovan, J. LeBouton and A. R. Graham</i>	1158
Conservative Management of Muscle-Infiltrating Bladder Cancer: Prospective Experience. <i>H. W. Herr</i> (Editorial Comment by J. B. deKernion)	1162
Topical Mitomycin C Therapy for Carcinoma of Bladder. <i>P. D. Stricker, A. B. F. Grant, B. M. Hosken and J. S. Taylor</i>	1164
Periurethral Abscess. <i>M. M. Walther, B. B. Mann and D. P. Finnerty</i>	1167
Erectile Angle: Objective Criterion to Evaluate Papaverine Test in Impotence. <i>E. Wespes, C. Delcour, C. Rondeux, J. Struyven and C. C. Schulman</i>	1171
Cavernosography in Diagnosis of Metastatic Tumors of Penis: 5 New Cases and Review of Literature. <i>G. Escribano, A. Allona, F. J. Burgos, R. Garcia, S. Navio and A. Escudero</i> (Editorial Comment by P. F. Schellhammer)	1174
Clinical Evaluation of Basic Fetoprotein in Testicular Cancer. <i>K. Harada, S. Morishita, A. Itani, H. Nagata, G. Hamami, M. Ishii, S. Kamidono and J. Ishigami</i>	1178
Prostatic Specific Antigen and Prostatic Acid Phosphatase in Monitoring and Staging of Patients With Prostatic Cancer. <i>C. J. Ercole, P. H. Lange, M. Mathisen, R. K. Chiou, P. K. Reddy and R. L. Vessella</i> ..	1181
Radical Prostatectomy for Carcinoma in Men More Than 69 Years Old. <i>A. W. Middleton, Jr.</i>	1185
Evaluation of Microscopic Hematuria: Population-Based Study. <i>I. M. Thompson</i>	1189
Complications of Chronic Indwelling Urinary Catheters Among Male Nursing Home Patients: Prospective Study. <i>J. G. Ouslander, B. Greengold and S. Chen</i>	1191

Urologists at Work

Retrograde Nephrostomy Tube Placement During Open Surgical Procedures Requiring Urinary Diversion. <i>M. K. Willscher and J. F. Conway, Jr.</i>	1196
Vasoactive Intracavernous Pharmacotherapy—Nursing Role in Teaching Self-Injection Therapy. <i>L. M. Duffy, A. A. Sidi and P. H. Lange</i>	1198

Urological Neurology and Urodynamics

Predictive Criteria for Failed Sphincterotomy in Spinal Cord Injury Patients. <i>J. K. Light, A. Beric and P. G. Wise</i>	1201
---	------

Pediatric Articles

Delayed Spontaneous Resolution of High Grade Vesicoureteral Reflux After Reimplantation. <i>M. H. Siegelbaum and H. H. Rabinovitch</i>	1205
Ipsilateral Ureteroureterostomy and Pyeloureterostomy: Review of 15 Years of Experience With 25 Patients. <i>T. K. Huisman, G. W. Kaplan, W. A. Brock and M. G. Packer</i>	1207
Anterior Urethral Valves in Fossa Navicularis in Children. <i>H. C. Scherz, G. W. Kaplan and M. G. Packer</i> ..	1211

Testicular Cancer Risk in Boys With Maldescended Testis: Cohort Study. <i>A. Giwercman, J. Grindsted, B. Hansen, O. M. Jensen and N. E. Skakkebaek</i>	1214
Thiazide Diuretics for Treatment of Children With Idiopathic Hypercalciuria and Hematuria. <i>L. C. Hymes and B. L. Warshaw</i> (Editorial Comment by F. B. Stapleton)	1217
Case Reports	
Preoperative Magnetic Resonance Imaging of Vena Caval Tumor Thrombi: Experience With 5 Cases. <i>T. R. Pritchett, J. K. Raval, R. C. Benson, G. Lieskovsky, P. M. Colletti, W. D. Boswell, Jr. and D. G. Skinner</i> ..	1220
Spontaneous Renal Artery Thrombosis: Successful Lysis With Streptokinase. <i>G. F. Pineo, W. C. Thorndyke and B. L. Steed</i>	1223
Is Serological Evidence of Infection With Syphilis Contraindication to Kidney Donation? Case Report and Review of Literature. <i>L. J. Gibel, W. Sterling, W. Hoy and A. Harford</i>	1226
Pelvic Lipomatosis: Nuclear Magnetic Resonance Appearance and Associated Vesicoureteral Reflux. <i>F. J. Allen and M. L. S. De Kock</i>	1228
Treatment of Superficial Papillary Transitional Cell Carcinoma of Ureter by Vesicoureteral Reflux of Mitomycin C. <i>A. Y. Smith, P. J. Vitale, B. A. Lowe and J. R. Woodside</i> (Editorial Comment by H. W. Herr)	1231
Carcinosarcoma (Mixed Mesodermal Tumor) of Ureter. <i>S. Fleming</i>	1234
Intravesical Herniation of Small Bowel After Bladder Perforation. <i>J. E. Oesterling, S. M. Goldman and F. C. Lowe</i>	1236
Bladder Wall Calcification After Topical Mitomycin C. <i>A. J. Alter and G. H. Malek</i>	1239
Simple Substitute for Missing Segment of Proximal Anterior Urethra. <i>H. J. Jewett and J. E. Oesterling</i> ..	1241
Penile Necrosis Secondary to Indwelling Foley Catheter. <i>G. C. McDowell, II, L. J. Hayden and H. A. Wise, II</i>	1243
37-Pound Scrotal Leiomyosarcoma: Case Report and Literature Review. <i>J. E. Echenique, S. Tully, R. Tickman, M. M. Walther, D. P. O'Brien and R. L. Judd</i>	1245
Aberrant Epididymal Tissue: Significant Clinical Entity. <i>M. Wollin, F. F. Marshall, M. P. Fink, R. Malhotra and D. A. Diamond</i>	1247
Prostatic Involvement in Wegener's Granulomatosis. <i>T. J. Stillwell, R. A. DeRemee, T. J. McDonald, L. H. Weiland and D. E. Engen</i>	1251
Prostatic Abscess Owing to Anaerobic Bacteria. <i>M. K. Brawer and T. A. Stamey</i>	1254
Transuterine Resection of Fibroids: New Approach to Management of Submucous Fibroids in Selected Patients. <i>F. A. Fried and J. F. Hulka</i>	1256
Special Communications	
KUH Notes. <i>G. E. Striker</i>	1258
Letters to the Editors	
Re: Predictive Parameters of Successful Varicocele Repair, by J. L. Marks, R. McMahon and L. I. Lipshultz. <i>N. R. Netto, Jr.</i>	1259
Re: Cystic Fibrosis Presenting in 45-Year-Old Man With Infertility, by D. G. Kaufman, L. L. Schulman and H. M. Nagler. <i>P. Mouriquand</i>	1259
Re: Condylomata Acuminata in Pediatric Patient, by T. B. Shelton, G. R. Jenkins and H. N. Noe. <i>J. M. Goldenring</i>	1259
Urinary Tract Infection by Salmonella Enteritidis. <i>A. Andreu-Domingo, F. Ojeda-Pérez and A. Coira-Nieto</i> ..	1260
Erratum	
Paratesticular Rhabdomyosarcoma	1260
INVESTIGATIVE UROLOGY	
This Month in Investigative Urology: Intracavernosal Injection Therapy for Impotence. <i>G. S. Benson</i>	1262
Chronic Papaverine Treatment: Effect of Repeated Injections on Simian Erectile Response and Penile Tissue. <i>M. Abozeid, K.-P. Juenemann, J.-A. Luo, T. F. Lue, T.-S. B. Yen and E. A. Tanagho</i>	1263
Effects of Some Calcium Channel Blockers on Isolated Human Penile Erectile Tissues. <i>M. Fovaeus, K.-E. Andersson and H. Hedlund</i>	1267
Seminal Vesicle in Eight and 16 Week Streptozotocin-Induced Diabetic Rats: Adrenergic, Cholinergic and Peptidergic Innervation. <i>H. E. Moss, R. Crowe and G. Burnstock</i>	1273
Study of Bladder Dysfunction During Streptozotocin-Induced Diabetes in Rat Using In Vitro Whole Bladder Preparation. <i>H. E. Moss, J. Lincoln and G. Burnstock</i>	1279
On Unilateral Testicular and Epididymal Torsion: No Effect on Contralateral Testis. <i>T. T. Turner</i>	1285
Use of Fresh Placental Membranes for Bladder Reconstruction. <i>I. J. Fishman, F. N. Flores, F. B. Scott, H. J. Spjut and B. Morrow</i>	1291
Extracorporeal Shock Wave Lithotripsy: Use of Chemical Treatments for Improved Stone Comminution. <i>S. R. Akers, F. H. Cocks and J. L. Weinerth</i>	1295
Progesterone Receptors in Female Lower Urinary Tract. <i>S. C. Batra and C. A. Iosif</i>	1301
Effects of Intravesical Instillation of Antitumor Chemotherapeutic and Immunotherapeutic Agents on Bladder Lesion Development in Rats Pretreated With N-Butyl-N-(4-Hydroxybutyl) Nitrosamine. <i>T. Okamura, M. Ohtani, K. Inoue, S. Fukushima, K. Ohtaguro and T. Kakizoe</i>	1305

Total and Specific Immunoglobulin Response to Acute and Chronic Urinary Tract Infections in Rat Model. *C. P. Davis, M. S. Cohen, M. D. Anderson, J. A. Reinartz and M. M. Warren* 1308

Inactivation of Bladder Tumor Cells and Enzymes by Methylene Blue Plus Light. *W. B. Gill, A. Taja, D. M. Chadbourne, M. Roma and C. W. Vermeulen* 1318

Urolithogenesis of Mixed Foreign Body Stones. *S. R. Khan and R. L. Hackett* 1321

Epidermal Growth Factor—Interactions With Normal and Malignant Urothelium: In Vivo and In Situ Studies. *E. M. Messing, P. Hanson, P. Ulrich and E. Erturk* 1329

Identification and Characterization of Alpha₁ Adrenergic Receptors in Canine Prostate Using [¹²⁵I]-Heat. *H. Lepor, M. Baumann and E. Shapiro* 1336

Investigative Grammar 1340

UROLOGICAL SURVEY

Author Index to Abstracts 1342

Treatment of First-Attack Genital Herpes—Acyclovir Versus Inosine Pranobex. *A. Mindel, G. Kinghorn, E. Allason-Jones, P. Wooley, I. Barton, A. Faherty, M. Jeavons, P. Williams and G. Patou* 1343

Effect of Salmonella Typhimurium Porins on Cardiovascular and Renal Apparatus. *F. Galdiero, M. A. Tufano, F. Rossi, W. Filippelli, D. De Santis, C. Matera, L. Berrino and E. Marmo* 1343

Guest Editorial: Interstitial Cystitis—1987. *E. M. Meares, Jr.* 1343

Rediscovering “Rare” Disease: Patient’s Perspective on Interstitial Cystitis. *V. Ratner* 1344

Interstitial Cystitis: NIH Perspective. *C. H. Rodgers and G. E. Striker* 1344

Transcutaneous Electrical Nerve Stimulation in Interstitial Cystitis: Update on Clinical Experience. *M. Fall* 1344

Surgical Treatment of Interstitial Cystitis: Indications, Techniques, and Results. *G. D. Webster and N. Galloway* 1344

Fever in Hospitalized Patients. With Special Reference to Medical Service. *J. E. McGowan, Jr., R. C. Rose, N. F. Jacobs, D. R. Schaberg and R. W. Haley* 1345

Anatomy, Physiology, and Neuropharmacology of Cancer Pain. *R. Payne* 1345

Factors Influencing Growth and Metastatic Behavior of Tumors. *M. S. Murthy, J. D. Travis and E. F. Scanlon* 1345

Extra-Adrenal Paraganglioma and Pulmonary Chondroma: Case Report and Review of Literature. *S. Keyhani-Rofagha, T. M. O’Dorisio, J. G. Lucas, M. B. Fontana and S. E. Tuttle* 1345

Renal Cell Carcinoma and Vasculitis: Report of Two Cases. *G. N. Hoag* 1345

Augmentation of Lymphoproliferative Activity of Tumor-Bearing BALB/c Mice to Soluble Tumor Antigens by Surgical Manipulation: Possible Role of Macrophages. *C. A. Laing, K. M. Japal and M. E. Baker* .. 1345

Epidemiology and Clinical Characteristics of Testicular Tumors in Saudi Arabia: King Faisal Specialist Hospital and Research Centre Experience. *M. A. El-Senoussi, N. K. Bissada, S. El-Akkad, A. Y. Bedikian, R. Morcos and C. Bull* 1346

Hemangiopericytoma of Prostate. *K. T. K. Chen* 1346

Orchiectomy Versus Long-Acting D-Trp-6-LHRH in Advanced Prostatic Cancer. *H. Parmar, L. Edwards, R. H. Phillips, L. Allen and S. L. Lightman* 1346

Isolation From Human Calcium Oxalate Renal Stones of Nephrocalcin, Glycoprotein Inhibitor of Calcium Oxalate Crystal Growth. Evidence That Nephrocalcin From Patients With Calcium Oxalate Nephrolithiasis is Deficient in γ -Carboxyglutamic Acid. *Y. Nakagawa, M. Ahmed, S. L. Hall, S. Deganello and F. L. Coe* 1346

Fibromuscular Dysplasia of Renal Artery—Management and Outcome. *A. Hägg, H. Åberg, I. Eriksson, L.-E. Lörelius and C. Mörlin* 1347

Early Diagnosis and Management of Renovascular Hypertension. *D. Tapper, T. Brand and R. Hickman* .. 1347

Reversible Hypertension Associated With Unrecognised High Pressure Chronic Retention of Urine. *D. A. Jones, N. J. R. George, P. H. O’Reilly and R. J. Barnard* 1347

Nonoperative Observation Therapy for Splenic Injuries: Safe Therapeutic Option?. *G. K. Luna and E. P. Dellinger* 1347

Injuries Associated With Off-Road Vehicles Among Children. *J. J. Wiley, W. M. McIntyre and P. Mercier* 1348

Growth and Development in Infants After Renal Transplantation. *S. K. S. So, P. N. Chang, J. S. Najarian, S. M. Mauer, R. L. Simmons and T. E. Nevins* 1348

Growth and Sexual Maturation in Children After Kidney Transplantation. *R. van Diemen-Steenvoorde, R. A. Donckerwolcke, H. Brackel, E. D. Wolff and M. C. J. W. de Jong* 1348

Growth After Renal Transplantation in Children. *R. N. Fine* 1349

Stomas Continent and Incontinent. *M. H. Ashken* 1349

Nutritional Aspects of Preoperative Management. *S. M. Weiss* 1349

Hematologic Problems in Preoperative Patient. *F. Fellin and S. Murphy* 1350

Prophylaxis for Deep Vein Thrombosis and Pulmonary Embolism in Surgical Patient. *G. J. Merli and J. Martinez* 1350

Distinction by Radioisotope Technique of Subgroup With Increased Thrombophilic Potential Among Patients Submitted to Major Abdominal Surgery. *A. Rasmussen, D. Toftdahl, J. Lindholt, G. Gram, C. Toftgaard and J. Jespersen* 1351

Preoperative Considerations in Geriatric Patient. *H. J. Keating, III* 1351

Prophylactic Antibiotics for Surgery. *E. J. Bergquist and S. A. Murphy* 1351

Pharmacologic Management of Critically Ill Patient in Perioperative Period—Emphasis on Sepsis Syndrome. <i>B. Chernow and G. P. Zaloga</i>	1351
Surgical Handicraft: Teaching and Learning Surgical Skills. <i>R. W. Barnes</i>	1352
Surgical Options in Management of Large Omphaloceles. <i>E. I. Hatch, Jr. and R. Baxter</i>	1352
Congenital Rectovesical Fistula in Absence of Imperforate Anus. <i>J. A. Berger and J. C. Barnes</i>	1352
Congenital Ureteral Valves in Children: Case Report and Review of Literature. <i>Y. Reinberg, H. Aliabadi, P. Johnson and R. Gonzalez</i>	1353
Management and Early Reconstruction of Urinary Tract Abnormalities Detected In Utero. <i>W. Thon, J. H. M. Schlickerieder, A. Thon and J. E. Altwein</i>	1353
Role of Urodynamics in Female Urinary Stress Incontinence. <i>D. J. Byrne, P. A. Hamilton Stewart and B. K. Gray</i>	1353
New Genetics: Will it Pay its Way?. <i>J. C. Chapple, R. Dale and B. G. Evans</i>	1353
Transrectal Ultrasonography Compared With Voiding Cystourethrography After Spinal Cord Injury. <i>G. J. Fellows, L. B. Cannell and G. Ravichandran</i>	1354
Persistent Adrenal Insufficiency Secondary to Low-Dose Ketoconazole Therapy. <i>T. A. Best, J. K. Jenkins, F. Y. Murphy, S. A. Nicks, K. L. Bussell and D. L. Vesely</i>	1354
Localized Deep Hyperthermia Increases Traffic of Lymphocytes Through Peripheral Lymph Nodes of Sheep In Vivo. <i>T. C. Moore, K. Nur and F. K. Storm</i>	1354
Medical Consultant. <i>G. J. Merli and H. H. Weitz</i>	1354
Diagnostic Imaging of Infertility, by A. C. Winfield and A. C. Wentz. <i>K. N. Van Arsdalen</i>	1354
Textbook of Genito-Urinary Surgery, by H. N. Whitfield and W. F. Hendry. <i>J. H. Nelson, III</i>	1355
Current Literature	1356

NUMBER 6. DECEMBER

CLINICAL UROLOGY**Review Article**

Overview of Intravesical Therapy for Superficial Bladder Tumors. <i>H. W. Herr, V. P. Laudone and W. F. Whitmore, Jr.</i>	1363
---	------

Special Article

Management of Clinically Localized Prostate Cancer. National Institutes of Health Consensus Development Conference, June 15–17, 1987	1369
--	------

Original Articles

Repeat Cadaver Kidney Transplantation Using Cyclosporine A Immunosuppression. <i>P. A. M. Anderson, P. Belitsky, H. Bitter-Suermann, A. D. Cohen and A. S. MacDonald</i>	1376
Adjuvant Medroxyprogesterone Acetate to Radical Nephrectomy in Renal Cancer: 5-Year Results of Prospective Randomized Study. <i>G. Pizzocaro, L. Piva, G. Di Fronzo, A. Giongo, A. Cozzoli, E. Dormia, S. Minervini, A. Zanollo, U. Fontanella, G. Longo and A. Maggioni</i>	1379
Fistulas of Upper Urinary Tract: Percutaneous Management. <i>P. J. Maillet, D. Pelle-Francoz, A. Leriche, R. Leclercq and C. Demiaux</i>	1382
Quality of Life Survey of Urinary Diversion Patients: Comparison of Ileal Conduits Versus Continent Kock Ileal Reservoirs. <i>S. D. Boyd, S. M. Feinberg, D. G. Skinner, G. Lieskovsky, D. Baron and J. Richardson</i> (Editorial Comment by W. S. McDougal)	1386
Malignant Vesical Tumors Following Spinal Cord Injury. <i>D. E. Bejany, J. L. Lockhart and R. K. Rhamy</i> ..	1390
Difficulties of Surveillance Study Omitting Retroperitoneal Lymphadenectomy in Clinical Stage I Nonseminomatous Germ Cell Tumors of Testis. <i>G. Pizzocaro, F. Zanoni, R. Salvioni, A. Milani, L. Piva and S. Pilotti</i> (Editorial Comment by J. P. Richie)	1393
Reassessment of Role of Adjunctive Surgical Therapy in Treatment of Advanced Germ Cell Tumors. <i>G. E. Carter, G. Lieskovsky, D. G. Skinner and J. R. Daniels</i>	1397
Neuroanatomical Approach to Radical Cystoprostatectomy With Preservation of Sexual Function. <i>P. N. Schlegel and P. C. Walsh</i>	1402
Postoperative Radiotherapy for Patients With Carcinoma of Prostate Undergoing Radical Prostatectomy With Positive Surgical Margins, Seminal Vesicle Involvement and/or Penetration Through Capsule. <i>M. S. Anscher and L. R. Prosnitz</i>	1407
Miconazole: Cost-Effective Antifungal Genitourinary Irrigant. <i>G. J. Wise, W. M. Goldman, P. E. Goldberg and R. G. Rothenberg</i> (Editorial Comment by C. M. Kunin)	1413

Urological Neurology and Urodynamics

Use of Transrectal Longitudinal Real-Time Ultrasonography in Urodynamics. <i>R. Shabsigh, I. J. Fishman and M. Krebs</i>	1416
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Pediatric Articles

Multicystic Dysplastic Kidney: Natural History From In Utero Diagnosis and Postnatal Followup. <i>E. F. Anni, Y. Thoua, B. Lalmand, F. Didier, P. Droulle and C. C. Schulman</i>	1420
Neurofibroma of Ureter. <i>J. Varela-Duran, M. Urdiales-Viedma, F. Taboada-Blanco and C. Cuevas</i>	1425

Editorial

- Adjuvant Radiotherapy After Radical Prostatectomy: Is It Indicated. *P. C. Walsh* 1427

Case Reports

- Clinically "Silent" Pheochromocytoma With Spontaneous Hemorrhage. *P. H. Lee, R. Blute, Jr. and R. Malhotra* 1429
- Mechanical Gastric Outlet Obstruction After Continent Urinary Diversion. *C. N. Barrilleaux, R. C. Leib and I. M. Thompson* (Editorial Comment by R. G. Rowland) 1433
- Retroperitoneal Fibrosis and Nonmalignant Ileal Carcinoid. *J. Scott, R. Foster and A. Moore* 1435

Letter to the Editor

- Diagnostic Nomenclature for Prostate Cancer. *W. A. Gardner, Jr., D. Coffey, S. P. Karr, A. Chiarodo, J. Epstein, J. E. McNeal and G. Miller* 1436

INVESTIGATIVE UROLOGY

- This Month in Investigative Urology: Mechanics and Neurophysiology of Intestinal Segments as Bowel Substitutes: Editorial Comment. *W. S. McDougal* 1438
- Impact of Detubularization on Ileal Reservoirs. *C. P. Schmidbauer, H. Chiang and S. Raz* 1440
- Testicular Tumors in Mice Exposed In Utero to Diethylstilbestrol. *R. R. Newbold, B. C. Bullock and J. A. McLachlan* 1446
- Use of Radiorespirometric Assay for Testing Antibiotic Sensitivity of Catheter-Associated Bacteria. *T. I. Ladd, D. Schmiel, J. C. Nickel and J. W. Costerton* 1451
- Divided Renal and Caval Vein Plasma Renin Activity in Two-Kidney Two-Clip Hypertension in Rabbits and Variations of Blood Pressure, Plasma Volume and Renal Function Following Unilateral Nephrectomy. *S. Yamasaki* 1457
- Bladder Outflow Obstruction—Cause of Denervation Supersensitivity. *M. J. Speakman, A. F. Brading, C. J. Gilpin, J. S. Dixon, S. A. Gilpin and J. A. Gosling* 1461
- Veno-Occlusive Mechanism of Canine Corpus Cavernosum: Angiographic and Pharmacologic Studies. *K. Valji and J. J. Bookstein* 1467
- Efficacy of Chemotherapeutic Agents Against Murine Bladder Metastasis. *J. E. Klaunig and B. A. Barut* .. 1471
- Investigative Grammar. 1474

UROLOGICAL SURVEY

- Author Index to Abstracts in Volume 138** 1476
- Renal Infection in Autosomal Dominant Polycystic Kidney Disease. *S. J. Schwab, S. J. Bander and S. Klahr* 1480
- Management of Obstructive Renal Candidiasis in Neonate. *P. J. Robinson, R. D. Pocock and J. D. Frank* . 1480
- Prevalence of Urethral Chlamydia Trachomatis and Neisseria Gonorrhoeae Among Asymptomatic, Sexually Active Adolescent Boys. *M.-A. Shafer, V. Prager, J. Shalwitz, E. Vaughan, B. Moscicki, R. Brown, C. Wibbelsman and J. Schachter* 1480
- Bacteriuria With Multiply Resistant Species of *Corynebacterium* (*Corynebacterium* Group D2): Unnoticed Cause of Urinary Tract Infection. *J. M. Aguado, C. Ponte and F. Soriano* 1481
- Efficacy of Routine Admission Urinalysis. *B. V. Akin, F. A. Hubbell, E. B. Frye, L. Rucker and R. Friis* ... 1481
- Congenital Mesoblastic Nephroma: Clinicoradiologic Study of 17 Cases Representing Pathologic Spectrum of Disease. *H. S. L. Chan, M.-Y. Cheng, K. Mancer, D. Payton, S. S. Weitzman, P. Kotecha and A. Daneman* 1481
- Bladder Cancer Detection and Surveillance: Carcinoembryonic Antigen as Monitor of Neoplastic Transformation. *M. Boileau, D. Swartz, K. Schmidt and W. Schmidt* 1482
- Intravesical Irrigation With Distilled Water During and Immediately After Transurethral Resection and Later for Superficial Bladder Cancer. *B. Moskovitz and D. R. Levin* 1482
- Carcinoma of Prostate Clinically and Radiologically Simulating Malignant Lymphoma. *Y. Liel, A. Biderman, C. Biran, M. Katz and M. Sacks* 1482
- Excretion of Three Major Prostatic Secretory Proteins in Urine of Normal Men and Patients With Benign Prostatic Hypertrophy or Prostate Cancer. *J. Tremblay, G. Frenette, R. R. Tremblay, A. Dupont, M. Thabet and J. Dubé* 1482
- Androgen Receptors Detected by Autoradiography in Prostatic Carcinoma and Benign Prostatic Hyperplastic Tissue. *B. S. Hulka, W. C. Beckman, Jr., H. Checkoway, G. Diferdinando, J. E. Hammond, F. A. Fried, D. D. Mickey, W. E. Stumpf and T. D. Clark* 1483
- Zinc, Cadmium and Selenium Concentrations in Separated Epithelium and Stroma From Prostatic Tissues of Different Histology. *A. Feustel, R. Wennrich and H. Dittrich* 1483
- Latent and Clinically Manifest Prostatic Carcinoma. *T. Hayashi, Y. Taki, K. Ikai, M. Hiura, T. Kiriyama and K. Shizuki* 1483
- Nuclear Roundness Factor: Quantitative Approach to Grading in Prostatic Carcinoma, Reliability of Needle Biopsy Tissue, and Effect of Tumor Stage on Usefulness. *T. D. Clark, F. B. Askin and C. R. Bagnell* .. 1484
- Activated Ki-ras Oncogene in Human Prostatic Adenocarcinoma. *D. M. Peehl, N. Wehner and T. A. Stamey* 1484

Steroid-Sensitive Proteins, Growth Hormone and Somatomedin C in Prostatic Cancer: Effects of Parenteral and Oral Estrogen Therapy. <i>R. Stege, N. Fröhlander, K. Carlström, Å. Pousette and B. von Schoultz</i> . . .	1484
Dihydrotestosterone Does Not Induce Prostate Adenocarcinoma in L-W Rats. <i>M. Pollard, D. L. Snyder and P. H. Luckert</i> . . .	1485
Neuroblastoma: Case for Screening Infants in North America. <i>W. G. Woods and M. Tuchman</i> . . .	1485
Serial Determination of Serum Neuron-Specific Enolase in Patients With Neuroblastoma and Other Pediatric Tumors. <i>Y. Tsuchida, T. Honna, T. Iwanaka, M. Saeki, N. Taguchi, T. Kaneko, R. Koide, Y. Tsunematsu, K.-i. Shimizu, S.-i. Makino, K. Hashizume and T. Nakajo</i> . . .	1485
Anesthesia for Intraoperative Radiation Therapy in Children. <i>R. H. Friesen, J. E. Morrison, Jr., J. J. Verbrugge, W. E. Daniel, N. O. Aarestad and J. D. Burrington</i> . . .	1485
Bleomycin-Associated Pulmonary Fibrosis: Rapidly Fatal Progression Without Chest Radiotherapy. <i>G. J. Dee, J. H. M. Austin and G. L. Mutter</i> . . .	1486
Regulation of Tumor Growth by Soluble Spleen Factors: Effect of Tumor Resection. <i>M. A. Jasnis, A. M. Eiján and S. Oisgold-Dagá</i> . . .	1486
Serum Creatinine Increase Associated With Amiodarone Therapy. <i>M. B. Jacobs</i> . . .	1486
Unpredictability of Clinical Evaluation of Renal Function in Cirrhosis. Prospective Study. <i>M. A. Papadakis and A. I. Arieff</i> . . .	1486
Evidence Suggesting Under-Treatment in Adults With Idiopathic Focal Segmental Glomerulosclerosis. Regional Glomerulonephritis Registry Study. <i>Y. Pei, D. Cattran, T. Delmore, A. Katz, A. Lang and P. Rance</i> . . .	1487
OKT3 Monoclonal Antibody in Pediatric Kidney Transplant Recipients With Recurrent and Resistant Allograft Rejection. <i>M. R. Leone, S. R. Alexander, J. M. Barry, K. Henell, M. B. Funnell, G. Goldstein and D. J. Norman</i> . . .	1487
Carbon Dioxide Laser Surgery of Female Genital, Perineal, and Anal Condyloma Acuminata. <i>H. Caglar, M. Erk and M. M. Hreschshyn</i> . . .	1487
Penile Function Following Intracavernosal Injection of Vasoactive Agents or Saline. <i>E. A. Kiely, P. Ignotus and G. Williams</i> . . .	1488
Accuracy and Reproducibility of Clinical Measures of Testicular Volume. <i>S. A. Rivkees, D. A. Hall, P. A. Boepple and J. D. Crawford</i> . . .	1488
Anatomy of Prostate From Fetus to Adult—Origin of Benign Prostatic Hyperplasia. <i>Y. Hiraoka and M. Akimoto</i> . . .	1488
Effects of Castration Compared With Total Androgen Blockade on Tissue Dihydrotestosterone (DHT) Concentration in Benign Prostatic Hyperplasia (BPH). <i>J. Geller and J. Albert</i> . . .	1488
Changes in Sexual Behavior of Couples After Prostatectomy. Prospective Study. <i>S. Cytron, D. Simon, E. Segenreich, Z. Leib and C. Servadio</i> . . .	1488
Molecular and Clinical Advances in Congenital Adrenal Hyperplasia. <i>W. L. Miller and L. S. Levine</i> . . .	1489
Fetal Hydronephrosis: Selection and Surgical Repair. <i>M. R. Harrison, M. S. Golbus, R. A. Filly, R. L. Anderson, A. W. Flake, M. Rosen and R. W. Huff</i> . . .	1489
Persistent Tubular Resistance to Aldosterone in Infants With Congenital Hydronephrosis Corrected Neonatally. <i>G. Marra, V. Goj, A. C. Appiani, C. A. D. Agnola, S. A. Tirelli, B. Tadini, U. Nicolini, G. Cavanna and B. M. Assael</i> . . .	1489
Pathologic Significance of Nephromegaly in Pediatric Disease. <i>A. N. Brenbridge, R. L. Chevalier, S. El-Dahr and D. L. Kaiser</i> . . .	1490
Does Expanding Fetal Abdominal Mass Produce Pulmonary Hypoplasia?. <i>L. Sauer, M. R. Harrison, A. W. Flake and T. R. Krummel</i> . . .	1490
Testicular Histology in Adolescent With Varicocele. <i>E. J. Kass, R. S. Chandra and A. B. Belman</i> . . .	1490
Diagnosis and Management of Hydrohematometocolpos Syndromes. <i>A. T. B. Tran, R. M. Arensman and K. W. Falterman</i> . . .	1490
Genital Findings in Sexually Abused, Symptomatic and Asymptomatic Girls. <i>S. J. Emans, E. R. Woods, N. T. Flagg and A. Freeman</i> . . .	1491
Risk of Transmitting Human Immunodeficiency Virus, Cytomegalovirus, and Hepatitis B Virus to Health Care Workers Exposed to Patients With AIDS and AIDS-Related Conditions. <i>J. L. Gerberding, C. E. Bryant-LeBlanc, K. Nelson, A. R. Moss, D. Osmond, H. F. Chambers, J. R. Carlson, W. L. Drew, J. A. Levy and M. A. Sande</i> . . .	1491
Bladder Control: Simple Self-Help Guide, by R. J. Millard. <i>J. R. Sotolongo</i> . . .	1492
Principles and Management of Testicular Cancer, by N. Javadpour. <i>W. R. Fair</i> . . .	1492
Current Literature . . .	1493
Volume Index and Contents	
Index, Volume 138 . . .	1497
Table of Contents, Volume 138 . . .	iii

SPONGIOSOLYSIS: A NEW SURGICAL TREATMENT OF IMPOTENCE CAUSED BY DISTAL VENOUS LEAKAGE

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ABSTRACT

Until recently ligation of the dorsal veins of the penis had been the only effective surgical treatment in cases of erectile dysfunction caused by venous insufficiency of the corpora cavernosa. Failure of this operation can be owing to persistent distal venous leakage consisting of venous shunts between the distal corpora cavernosa and corpus spongiosum, which can be demonstrated by cavernosography. These shunts can be closed successfully by spongiosolysis, that is by dissecting the distal half of the corpus spongiosum and by isolating the tips of the corpora cavernosa. Of 5 patients who underwent spongiosolysis after previous ligation of the dorsal vein of the penis 4 regained erectile ability with the help of intracavernous injection of a vasoactive drug mixture (15 mg. per ml. papaverine hydrochloride plus 0.5 mg. per ml. phentolamine mesylate, 0.5 to 2 ml. per injection), which was necessary because of concomitant arterial lesions demonstrated by arteriography. The only failure proved to be persistent venous insufficiency of the deep dorsal vein of the penis. Since none of the patients had any serious complication spongiosolysis seems to be a safe procedure in the treatment of distal venous leakage. (*J. Urol.*, 138: 784-786, 1987)

First attempts to treat surgically erectile dysfunction caused by venous insufficiency were made at the beginning of this century. In 1902 Wooten suggested ligation of the dorsal veins of the penis as treatment of "atonic impotence".¹ More than 30 years later Lowsley and Bray re-emphasized the importance of venous drainage in the genesis of impotence.² However, only recently after the introduction of cavernosography and cavernosometry as diagnostic methods could effective surgical procedures, namely ligation and embolization of the dorsal veins of the penis, be developed.³⁻⁵

Occlusion of these veins can be successful in only 80 per cent of the patients, since this treatment does not resolve the distal venous leakage owing to venous shunts between the corpus spongiosum and the distal corpora cavernosa, as demonstrated morphologically by Tudoriu and Bourmer.⁶ To date there is limited experience concerning the treatment of distal venous leakage.⁷ For this reason we developed a new surgical procedure, called spongiosolysis, that guarantees complete closure of all distal shunts of the corpora cavernosa.

INVESTIGATIONS AND SURGICAL METHOD

Our investigations began with anatomical studies of the genitals of male cadavers, including histological examination of the distal portion of the penis (fig. 1). Based on this anatomical work we were able to perform spongiosolysis. Circumcision is performed with the patient under general anesthesia. The skin of the penis is drawn back to the root of the organ and a tourniquet is placed under tension (fig. 2, A). The corpus spongiosum is dissected completely in its distal half. Thus, all venous shunts between the corpus spongiosum and corpora cavernosa are transected. An indwelling catheter facilitates the procedure (fig. 2, B). Finally, the dissection is continued to the glans penis, where the tips of the corpora cavernosa are isolated entirely from the glans (fig. 2, C). Hemostasis, reapproximation of Buck's fascia with interrupted 3-zero chromic catgut sutures and sutures of the skin complete the operation. A circular pressure bandage is kept for 3 days to prevent hematomas.

Evaluation of the venous drainage was done by the method

described by Wespes and Schulman.³ A passive erection was obtained by filling the cavernous bodies with dilute contrast medium infused at a rate of 80 to 120 ml. per minute. The diagnosis of venous leakage was established when a higher flow rate was necessary to complete the erection as confirmed by radiological studies showing venous leakage of the contrast medium.

All patients undergoing spongiosolysis had previous ligation of the dorsal penile veins with radiological demonstration of venous communications between the corpora cavernosa and corpus spongiosum.

RESULTS

To date 5 patients 34 to 45 years old have undergone spongiosolysis (see table). In all patients ligation of the dorsal veins



FIG. 1. A, longitudinal section of distal portion of penis. H & E, reduced from $\times 1$. B, inset from part A shows slightly dilated vein (arrow) adjacent to tunica albuginea of corpus cavernosum. H & E, reduced from $\times 14$.

of the penis was not successful because of persistent distal venous leakage. Cavernosography revealed immediate passage of contrast medium from the corpora cavernosa to the corpus spongiosum and glans in every patient (fig. 3, B). After spongiosolysis 4 patients regained erectile ability with the help of intracavernous autoinjection therapy of a vasoactive drug mixture (15 mg./ml. papaverine hydrochloride plus 0.5 mg./ml. phentolamine mesylate, 0.5 to 2 ml. per injection), which was necessary because of concomitant arterial lesions (arterial dysplasia in 3 patients and diabetic angiosclerosis in 1). One patient remained impotent after spongiosolysis. Cavernosography showed continuous draining of contrast medium via the deep dorsal vein of the penis that had been missed during ligation of the dorsal veins, whereas distal venous leakage had vanished. We expect this patient to obtain normal erections after ligation of the deep dorsal vein.

Except for a small injury of the urethra in 1 patient that healed without any sequelae, no complications occurred perioperatively or postoperatively after a short-term followup of 6 to 8 months.

The importance of cavernosography in the diagnosis of venous leakage is illustrated by patient 2 in the table. Preoperatively, cavernosography showed distal venous leakage as well as insufficiency of the deep dorsal vein of the penis (fig. 3, A). After ligation of the dorsal vein distal venous leakage was enhanced (fig. 3, B). The patient had only incomplete erections.

However, after spongiosolysis venous leakage subsided completely (fig. 3, C).

DISCUSSION

Venous leakage can be the sole or a concomitant cause of erectile dysfunction in men. Cavernosography and cavernosometry are of paramount importance in the diagnosis of abnormal drainage of the corpora cavernosa.³ The majority of the patients will regain spontaneous erections after ligation of the dorsal veins of the penis. However, in the presence of distal venous shunts between the corpora cavernosa and corpus spongiosum other surgical measures are required. To date only Ebbehøj and Wagner have reported on 4 patients with distal venous leakage operated on by dissection of the glans dorsally.⁷ By this means they transected the venous shunts. However, this dorsal approach includes the danger of injury to the dorsal nerves, which are responsible for sensitivity of the glans. Moreover, venous shunts between the distal portion of the corpus spongiosum and corpora cavernosa may be missed. This is not the case when spongiosolysis is performed. Complete transection of all venous leaks is guaranteed by careful dissection of the distal half of the corpus spongiosum and glans. This result could be demonstrated by postoperative cavernosography in every operated patient. Therefore, spongiosolysis could be the treatment of choice in patients with distal venous leakage. A larger number of patients and long-term followup are necessary to confirm these preliminary results.



FIG. 2. A, circumcision is done and skin is drawn back to root of penis. B, dissection of corpus spongiosum. C, dissection of tips of corpora cavernosa (held by Allis clamps).

Spongiosolysis: surgical results in 5 patients

Pt. No.—Age	Causes of Erectile Dysfunction		Complications	Followup (mos.)	Postop. Cavernosography	Functional Results
	Venous Leakage	Others				
1—44	Pos.	Arterial dysplasia	—	8	No evidence of venous leakage	Complete erection with vasoactive drugs
2—35	Pos.	Arterial dysplasia	Injury of urethra (without sequelae)	7	No evidence of venous leakage	Complete erection with vasoactive drugs
3—41	Pos.	Diabetic angiosclerosis	—	7	No evidence of venous leakage	Complete erection with vasoactive drugs
4—34	Pos.	Arterial dysplasia	—	6	No evidence of venous leakage	Complete erection with vasoactive drugs
5—45	Pos.	—	—	6	Insufficiency of deep dorsal vein	Insufficient erections

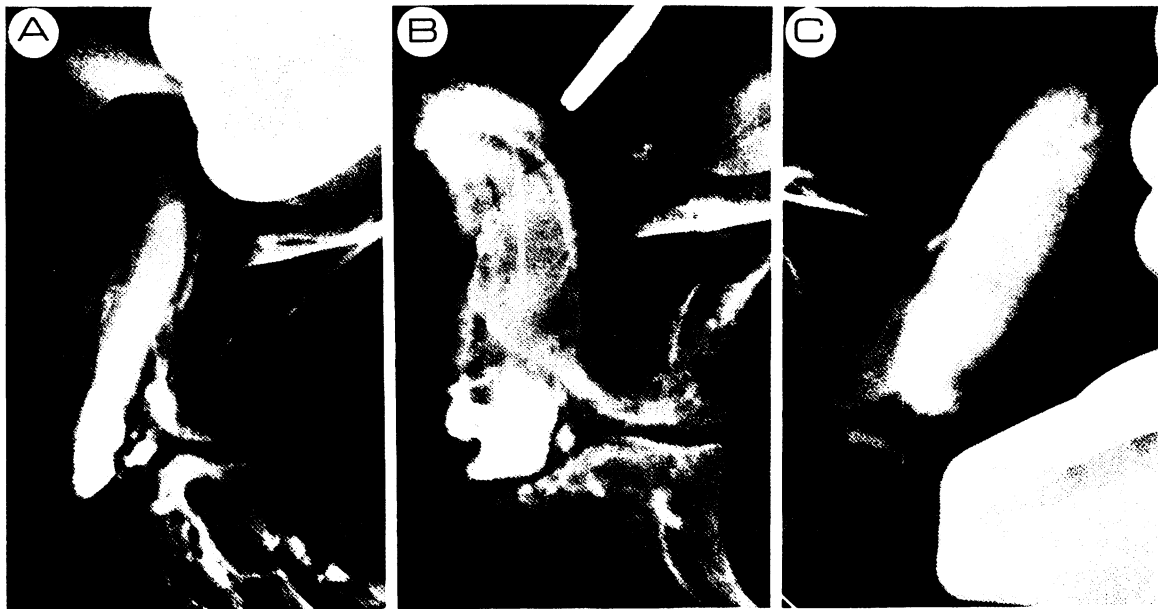


FIG. 3. Patient 2 in table. A, cavernosogram with venous leakage preoperatively. B, after ligation of dorsal penile veins. C, after spongiosolysis.

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