

# **“URETERIC CATHETERIZATIONS IN UROLOGICAL PROCEDURES, A MODIFIED METHODOLOGY.”**

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**“ABSTRACT”-INTRODUCTION** : Ureteric Catheterization Is Extensively Used In Various Urological Procedures:(I)Open Classical Surgical Procedures:Open Stone Surgery(OSS) Etc.(II)PCNL, Per-Cutaneous Nephrostomy(III) ESWL: In Large Stone Size, High Density Cases, To Avoid Stein-A-Strasse (IV) Lap. Uretero-Lithotomy, Endoscopy:Retro-Grade Pyelography(RGP), Uretero-RenoScopy (+-) Lithoclast Etc.(V) Drainage Procedures- External/ Internal, Ureteric Sampling, Inf. Localization.

**AIMS/OBJECTIVES** : Double-J-Stent/J-J Stent(DJS) Are Commonly Available Appliances In Cl. Practice, For Ureteric Patency Achievement During Different Surgical Procedures. Sometimes Pig Tail Catheters Are Employed. The Present Study Deals With The Successful Use Of Commonly Available Infant Feeding Tubes(IFTs)No.5/6 Usually & Sometimes No.7/8, To Achieve Reno-Vesical(R-V)Patency During Various Surgical Procedures Involving Pyelotomy,Nephrotomy,Calycotomy Repairs, Ureteric Anastomosis Etc.

**METHODS** :Successful Use Of Infant Feeding Tubes, As Ureteric Patency Catheterization, Done In Hundreds Of Patients Undergoing Pyelo-Plasty, Pyelo-Lithotomy, Nephro-Lithotomy,Calyco-Lithotomy, Uretero-Lithotomy,Lap.Uretero-Lithotomy , Renal /Ureteric Tumor Surgeries, Ureteric Strictures EndToEnd Anatomosis,Ureteric Trauma Surgeries Etc. After Stone Extraction,Tumor/Stricture Excision,Reconstructive Repairs,Appropriate Size Infant Feeding Tube Obliquely Cut At Both The Ends, Is Negotiated From Pyelotomy/ Ureterotomy Wound, First Downwards To U.B,Confirmed By Coming Out Of Urine On Suction With A Syringe,& Then The Upper Oblique End Was Gradually Manipulated To Renal Pelvis Or Desired Pelviccalyceal Position. For Maximal RV Drainage.Pyelotomy & Ureterotomy Wounds Were Meticulously Secured With Discrete 3-0 Sutures,Avoiding Subsequent Narrowing.Surgical Wound Closed In Layers, With Peri-Renal/Peri-Uretric Drain,Had Very Small Amount Drainage, Due To Patent Reno- Vesical Tract,Allowing Proper Healing Of Pyelotomy/Ureterotomy.The Drainage Becoming Absolutely Dry,In 2-3 Days Time, Were Removed.

**RESULTS** : The Comparative Evaluation Assessments For Use Of DJS / Infant Feeding Tubes, To Achieve Ureteric Patency As Described In Above Mentioned Procedures,Has Been Studied As: -Comparatively Very Low Cost, Yet Easy Availability Of Needed Different Calibres Of IFTs,In Sterile Packs.

-Simplicity Of Insertion, Placement, With Ensured Reno-Vesical Patency,Avoiding Hazards Of Comparatively Much Costlier DJS Insertion & Secured Placement To UB Below & Kidney Above, Retaining Proper Curves & Positioning,Needing Not Readily Available Guide-Wires Etc.

-The Most Important Advantage Of IFTs Use, Being Their Spontaneous Passage With Urine In About A Week Time,In About More Than 90-95% Cases. Aware Patients Are Advised To Pull Out Pouting TubeThroughUrethral Orifice WithOut Getting Panicky.

Spontaneous Passage Ratio Being Higher In Female Patients.In Some Females Patients Retained IFTs In U.B, Not Able To Pass Per Urethra,Had Been Removed Safely, With Simple Haemostat,Under Cautious Radiological Screening.

-Spontaneous Passage Of IFTs Thus Minimize Procedural Needs For Cystoscopic Removal Of DJS,Necessary In All Cases Of DJS Insertion,With OverAll Comparative Successful Result Out Comes, In Regards To R-V Patency Aspect.

**CONCLUSION** : The Alternative Use Of IFTs Instead Of DJS, Can Be Advocated, As An Accomplished Modified Methodology, As In Described Circumstances,With The Advantages Of Comparative Result Out Comes,Very Low Costs, Avoiding Hazards Of Availability, Difficulty During Insertion & Placement Needing Added Appliances For Positioning & Complete Cystoscopy System WithExpertise, At The Time Of Removal.

HowEver For Extensive Urology, Gynaeceological, Pelvic Surgeries, Surgical Oncology Procedures,The Available Use Of Needed DJS/PigTail Catheters, Is Recommended.

**KEY WORDS:**1.Ureteric Catheterizations 2.Ureteric Stents 3.Stent Symptoms 4.Ureteric Calibration & Patency Maintenance  
5. Infant Feeding Tubes(IFTs) Use Comparative Evaluation.

## **1.INTRODUCTION**

**‘Ureteric Catheterization’** Is Extensively Used ‘Manovre’ In Various Urological Procedures,With An AimTo Achieve-

1. Benign Or Malignant Obstruction Relieve
  2. PeriOperative Placement For Identification Of Ureters eg Pelvic Surgeries,AlignMent Of Drainage System Maintenance Of Luminal Calibre & After Ureteral Interventions(URS) To Avoid Spasm WithHealing Felicitation.
  3. As An Adjunct To Stone Surgery- For ESWL, Intra-Luminal Lithotripsy, Ureteral Instrumentation & For Stone Visualization.
  4. For Urinary Leak Management - Leak Due To Trauma Or Surgery, Leak From Ureteral Fistula.
- The Various Different Applicabilities Include-**

### **(A.)OPEN CLASSICAL SURGICAL PROCEDURES:**

- **OPEN STONE SURGERY(OSS):** Pyelo-Lithotomy,Nephro-Lithotomy,Uretero-Lithotomy
- PUJ Obstructions,Tumor Surgeries Resections-----

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- Ureteric Anastomosis Procedures;Strictures
- Tumors,Ureteric Line Accomplishments
- ?Retro-Peritoneal Fibrosis,
- Ureteric Kinks D/T Visceroptosis Etc
- VUJ Stones;Ureteric Orifice Ureterotomy
- Trauma ?Iatrogenic During Uterine Surgeries Etc.

### **(B.)PCNL, PER-CUTANEOUS NEPHROSTOMY(PCN)**

**(C.) ESWL:**In Large Stone Size, High Density Cases,To Avoid ‘Stein-A-Strasse’(Street Of Stones)

[15,16,17,18,19,20]

### **(D.) LAP. URETERO-LITHOTOMY,ENDOSCOPIES:**

Retro-Grade Pyelography(RGP),  
Uretero-RenoScopy(+-) Lithoclast Etc.

**(E) FOR DRAINAGE PROCEDURE:** Minimal/Delayed/  
Early Non-Functioning Kidneys Cases: ?D/T

Obstructive Uropathy, As Revealed By Renal Scans;  
DTPA (+-) Forced Diuresis,  
DMSA Renal Perfusion Studies Etc.

[6,7,8,9,10,11,12,13,14,21,22]

Localization OF Site Of Infection?Bacteriuria

**DIFFERENTIAL URETERAL CATHETERIZATION TEST-** Also K/A **Differential Renal Function Test / Split Renal Function Test**, Is Performed For Determination Of Various Functional Parameters Of One Kidney As Compared With The Contralateral Kidney. Ureteral Catheterizations Is Done By Cystoscopy In B/L Ureters Or Renal Pelvis. The Simultaneous Measurements Are Made Of Urine Flow Rate, Insulin, Or PAH (If Infused), Endogenous Creatinine, Or Various Urinary Solutes From B/L Urinary Systems.

## 2. AIMS/OBJECTIVES

**Double-J-Stent/J-J Stent (DJS)** Are Commonly Available Appliances In Clinical Practice. However, For Ureteric Patency Achievement During Different Surgical Procedures, Sometimes **'Pig Tail Catheters'** & Other Availables Are Employed.

The Present Study Deals With The Successful Use Of Commonly Available **'Infant Feeding Tubes'** (IFT) No. 5/6 Usually & Sometimes No. 7/8, To Achieve **Reno-Vesical (R-V) Patency**, During Various Surgical Procedures Involving Pyelotomy, Nephrotomy, Calyctomy, Repairs, Ureteric Anastomosis Etc.

## 3. DISCUSSION

One Of The Most Common Devices Used By Urologists, **'Ureteral Stent'** Sometimes Known As **'Ureteric Stent'** (A Thin Tube Inserted Into The Ureter, To Prevent Or Treat Obstruction Of The Urine Flow From The Kidney & To Ensure The Patency Of A Ureter.) Represent The **Most Mature Application Of An Indwelling Endoluminal Splint**, First Described By **Zimskind Et Al In 1967**, With The Intent Of Implantation For The Treatment Of **Ureteral Obstruction Or Fistula**.

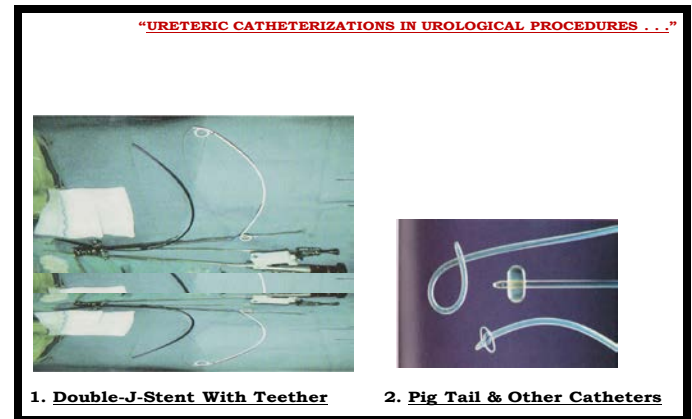
[1,2,3,4,5]

For The Purpose Of **'Ureteric Catheterizations'** i.e To Achieve Urinary Drainage From Kidney To Urinary Bladder Or To An External Collecting System, Thin Flexible Tubes, **Depending Upon Patients' Anatomy & Indication For Use, Different Sizes, Shapes & Constituting Material Of 'Ureteral/Ureteric Stents'** Are Employed. Usually Variations Of Size, **'Stents' Length'** 5-12 Inches (12-30 Cms) & **Diameter** 0.06-0.2 Inches (1.5-6 Mms) Are Available. **One Or Both Ends Of The Stents Are Curled To Retain Them In Position, Named As JJ Stent / Double J Stent (DJS) Or Pig-Tail Stent. Sometimes, One End Of Stent Has An Attached Thread, That Extends Through U.B, Urethra To Outside Ext. Urinary Orifice, Assisting At The Time Of 'Stent Removal'. The Constituting Stent Material Needs To Be Flexible, Durable, Non-Reactive & Radio- Opaque.** [23,24]

**'STENT' INSERTION:** After Proper

**Diagnosis (USG, CT/CECT, Pyelography: IVU, Cystoscopy; RGP Etc.)** With Completely Explained Procedural Details & Written Consent, Needed Part Preparation & AntiBiotic Coverage, Under Sedation/StandBy Anaesthesia/Anesthetic Lubrication

Jelly/Local/Regional S.A/G.A, Compliant Patient In Lithotomy Position, **Cysto-Urethroscopy Is Performed**, With Available Or Fibre-Optic Flexible CystoScope, With Noted Comment Upon Ext. Urethral Orifice, Different Parts Of Urethra, Veru-Montanum, Prostatic Urethra, Prostatic Lobes ? EnlargeMent, Urinary Bladder Mucosal Status,



**Photograph 1**

Trabeculations, Sacculations, Diverticulae, Other Obstructive Uropathy Changes, Presence Of Stone, Tumour Etc.

**'Bladder Trigone' With Both Ureteric Orifices & Intervening Inter Ureteric Bar** Identified, **Guide Wire** Is Negotiated Through Ureteric Orifice, Ureter To Renal Pelvis, **DJS** Mounted On Guide Wire, Pushed Above By 'Introducer', Upper End (Curl) Is Placed In Desired Renal Pelvi-Calyceal System & Lower End (Curl) In Urinary Bladder. **Under Available C-Arm Screening, Guided Confirmation Plays, An Important Role.** Guide Wire & Cystoscopic System Is Carefully Removed.

**AFTERCARE:** Includes Immediate Post-Operative Care (? Anaesthesia),

Needed Medications (Antibiotics, Analgesics Etc.), Control X-Ray KUB For Proper Positioning With Periodic Check Ups & Needed Management.

**ALTERNATIVES; In Circumstances Of Complete Ureteral Obstruction** (Due To Stone, Stricture, Severe Spasmodic Ureteritis, Malignancy & Other Luminal / Intra/ Extra-Luminal Causes), **Per-Cutaneous Nephrostomy (PCN) Is Performed. Under USG Guidance,** Negotiated Guide Wire At The Involved Pelvi-Calyceal System Region, After Gradual Calibration Of Tract, Usually Pig-Tail Catheter Is Advanced Into Kidney & Then To Ureter & U.B, Otherwise, The Outer End Of Stent Is Connected To **External Drainage System (UroBag).**

**STENT REMOVAL:** **'Threaded Stents'** Are Usually Removed With Gentle, Cautious 'Pulling Out Manoeuvre', Safely In OPD. While For **Stents Commonly Used Now A Days, Complete Cysto-Urethroscopy System** Is Needed, With Anaesthesia/Sedation Provision.

**SIDE EFFECTS & COMPLICATIONS;** [56,57,58,59,60,61] **Main Complications -**

Dislocation, Infection And Blockage By Encrustation. Recently Stents With Coatings Eg Heparin, Are Approved To Reduce Infection ,Encrustation & To Reduce Stent Exchanges Frequency.

**Other Complications** - Increased Urgency And Frequency Of Urination, Leakage Of Urine,Haematuria, Pain In The Kidney, Bladder, Or Groin, Especially After Urination.These Symptoms Are Generally Temporary And Disappear With Stent Removal.

**Various Recommended Medications** Are Of Significant Help. [77,78,79,80,81,82,83,84,85,86]

Incontinence,Vesico-Ureteric Reflux,Pyuria,Fractured, Forgotten Stent & Ureteral Erosion & Fistulization Are **Known Complications.**

**In 'Threaded Stents'**- Urethral Irritation Occurrence ,Especially Hypospadias Or Other Conditions Needing SimilarCorrective Surgery,NeedsCautious Thread Care & 'Stent Removal'To Avoid Dislodgement.

**With Properly Placed Stent In-Situ, Most Normal Activities Are Not Effected,** However Some Discomfort During Strenuous Physical Activity May Occur.

**Almost Normal Sexual Activity** Can Be Achieved InPatients With Stent, Exercising Cautious Different Sexual Approach & Certain Barrier Contraception Use.

**With 'Threaded Stents' Significant Hindrance Of Sex Is Reported.**

**Due To Prostate Gland Movement, With Overlying Stent** , Severe Cramping, Irritation Or Discomfort During Ejaculation/Orgasm May Occur.

**IDEAL 'URETERAL STENT':** BioCompatible,BioDurable With Better Patient Tolerance, Radio-Opaque & Or USG Visibility, Ease Of Insertion From Any Access,Migration Resistant,Optimal Flow CharacterStics, Non Refluxing, Encrustation Resistant, Ease Of Removability & Exchangeability,Verstality Yet Affordability **Are The Worth Achieving, Needed Criteria.**

### **IDEAL 'URETERAL STENT' DESIGN**

**EVOLUTION:**[23,24,25,26,27] Related Largely To Stent Material Biocompatibility & 'Design' To Some Extent , 'Stent Morbidity,Nullification/Reduction & Ideal Stent Preparation [28,29,30,31,32,33,34]

Standardized Softness Of **Silicone Material** Negated By High Coefficient Of Friction Of Silicone, Initiated Use Of **Polyethylene**, But Urinary Environment Unstability Leading To Fracture Stents Etc.

**Polyurethane** Was Substituted &Continued To Be Used In Stent Construction,Either Alone Or In Combination With Other Materials. [35,50,51,52,53,54,55]

More Recently, Copolymers Such As **C-Flex** (Concept Polymer Technologies, Clearwater, FLA),

**Percuflex** (Boston Scientific, Natick, Mass), And **Flexima** (Boston Scientific)

Have Been Used In The Construction Of **Double-J Or Double-Pigtail Catheters.** [62,63,64,65]

**Hydrophilic Gel Coatings** Are Added To Assist Placement And Reduce Encrustation And Complicating Infection.[74,75,76]

**Biodegradable Materials And Metal Stents,** Are In Study Process. [66,67,68,69,70]

**Indwelling Time** (Time A Stent Is In-Situ Position), Is Usually Determined By Placement Indication Combined With Physician Experience & Range From A Few Days For Relief Of Ureteral Edema To Life Long Duration, For Ureteral Patency Maintenance In Malignant Diseases. Regardless Of The Stent Composition, Usual Recommendations Are For 'Stents Exchange' At 3- To 6-Month Intervals,While Increased Prevalence Of Complications With Longer Indwelling Times Is Reported. [71,72,73]

'**Case Western Reserve University'**,Recorded Coding For **Kidney, Ureter And Bladder Procedures Medical Terminologies,Includes-Ureteral Stenting Codes:Pertinent Ureteral Tailoring Codes With Codes For-** Cystoscopy,Pyeloplasty (Foley Y-Pyeloplasty), Plastic Operation On Ureter, Nephropexy, Nephrostomy, Pyelostomy, Or Ureteral Splinting, Simple Pyeloplasty Complicated (Congenital Kidney Abnormality, Secondary Pyeloplasty, Solitary Kidney, Calycoplasty) & Others.

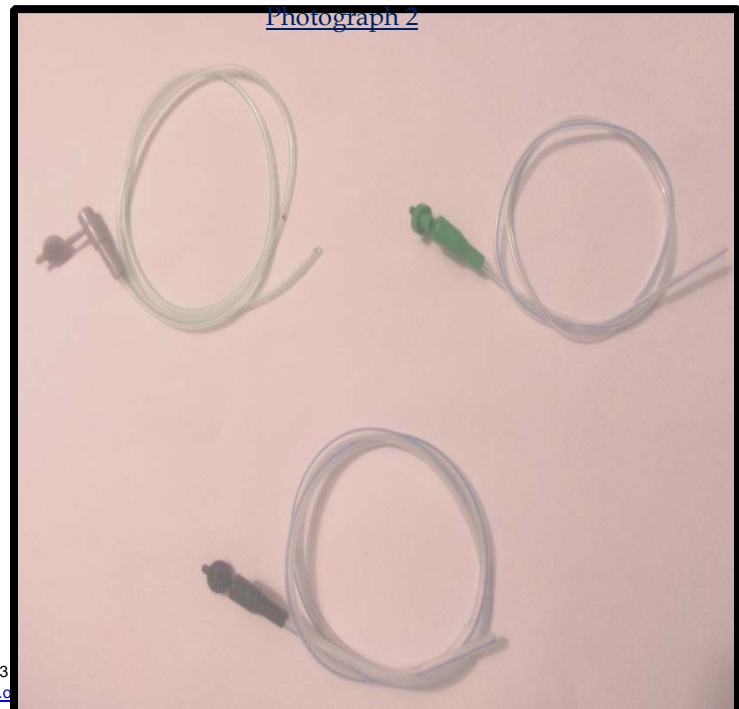
### **3.METHODS**

#### **'IFT' INSERTION TECHNIQUE:**

After Stone Extraction,Tumor/Stricture Excision, Recostructive Repair

- Appropriate Size Infant Feeding Tube 'Obliquely Cut' At Both The Ends,Is Negotiated From 'Pyelotomy' / 'Ureterotomy' Wounds
- First DownWards To U.B,Confirmed By Coming Out Of Urine On Suction With A Syringe
- Then The Upper Oblique End:Gradually Manipulated To Renal Pelvis Or Desired Pelviccalyceal Position

Photograph 2



**INFANT FEEDING TUBES (IFTs) No. 5, 6 & 10**

**FOR MAXIMAL RENO-VESICAL DRAINAGE:**

- **Pyelotomy & Ureterotomy Wounds**, Were, Meticulously Secured With Discrete 3-0 Sutures, Avoiding Subsequent Narrowing.
- **Surgical Wound Closure**, In Layers, With Peri-Renal/ Peri-Uretric Drain.

**Post-Operative Period:** Had Very Small Amount Drainage, Due To Patent 'Reno-Uretero-Vesical Tract', Allowing Proper Healing Of Pyelotomy / Ureterotomy. The Drainage Becoming Absolutely Dry, In 2-3 Days Time & Removed.

**The Direct Relation Of Foleys' Catheter Removal With Ureteral Stents Retainment In-Situ & Passage Downwards Towards Urinary Bladder Outwards**, Explainable By Uro-Dynamic Fundamentals & Is Practically Monitored By 'Peri-Nephric Drainage' Status, Once Dried, Removal Of Foleys Catheter Will Facilitate Forward Movement Of IFT, Down To Bladder & Outside Body, By Normal Urodynamics.

Wires Etc.

**At Ease, Spontaneous Passage With Urine**, In About A Weeks Time, Being The Most Important Advantage Of IFTs Use, Successfully Recorded, In About More Than 90-95% Cases.

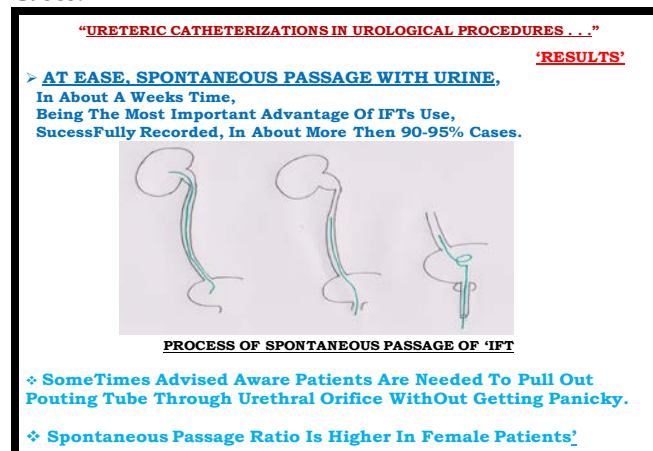


Figure 2

**PROCESS OF SPONTANEOUS PASSAGE OF**

**'IFTs'** Sometimes Advised Aware Patients Are Needed, To Pull Out Pouting Tube Through Urethral Orifice Without Getting Panicky. Spontaneous Passage Ratio Is More In Female Patients. Spontaneous Passage Of IFTs, Thus Minimize Procedural Needs For Cystoscopic Removal Of DJS, Necessary In All Cases Of DJS Insertion, With Over All Comparative Successful Result Out Comes, In Regards To R-V Patency Aspect.

**OTHER SIDE-EFFECTS / COMPLICATIONS OF URETHRAL STENTING:** Stent Symptoms; Pain, LUTS, Dysuria, Haematuria, Back Pain, UTI. Incorrect Placement, Migration, Stent Blockage, Forgotten Stent Etc, Can Be Cautiously Avoided By Secured Adherence, To Proper Asepsis, IFTs Procedural Technique, & Compliance Etc.

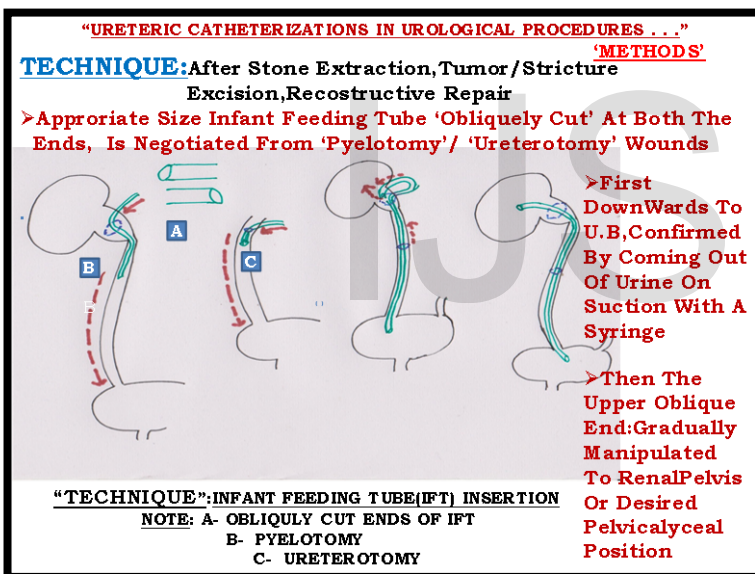


Figure 1

**4. RESULTS**

The 'Comparative Evaluation Assessments', For Use Of 'DJS' & 'Infant Feeding Tubes (IFTs)', To Achieve Ureteric Patency As Described In Above Mentioned Procedures, Has Been Studied As: **Comparatively Very Low Cost, Yet Easy Availability**, Of Needed Different Calibres Of IFTs, In Sterile Packs.

**Simplicity Of Insertion, Placement, With Ensured Comparative Reno-Vesical Patency** Avoiding Hazards Of Comparatively Much Costlier DJS Insertion & Secured Placement To UB Below & Kidney Above, Retaining Proper Curves & Positioning, Needing Not Readily Available Guide-

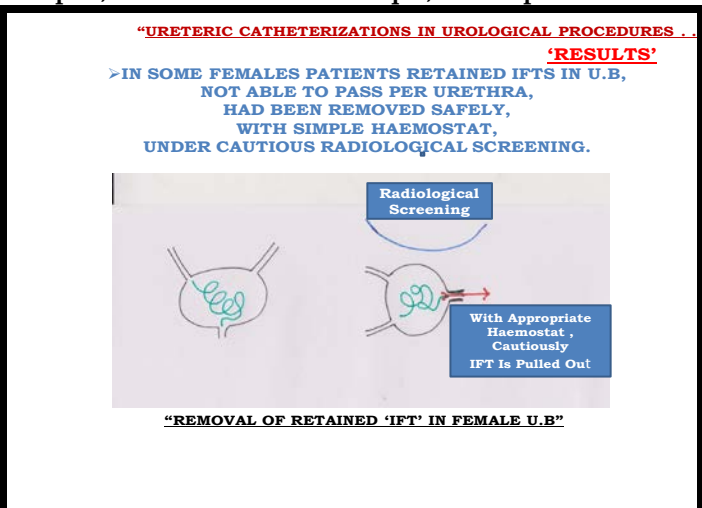


Figure 3

**In Some Females Patients Retained IFTs In U.B**, Not Able To Pass Per Urethra, Had Been Removed Safely, With Simple Haemostat, Under Cautious Radiological Screening.

## **5.CONCLUSION**

**The Alternative Use Of IFTs Instead Of DJS, Can Be Advocated, As An Accomplished 'Modified Methodology', Especially In Limited Resources Availability Circumstances. With "Secured Comparative Result Out Comes", The Advantages Include:**

- Very Low Costs, Easy Availability Of Different Calibres, In 'Sterile' Packing.
- Simple, Safe Procedural Benefits, Avoiding Hazards Of Availability, Difficulty During Insertion & Proper Placement; Positioning In-Situ.
- Avoidance Of Need For Complete 'Cystoscopy System' With Expertise, At The Time Of Removal.

**However For Extensive Urology, Gynecological, Pelvic Surgeries, Involving Ureteric Delineation, Reconstructive Repairs, Surgical Oncology Procedures, The Available Use Of Needed DJS/PigTail Catheters, Is Recommended.**

## **6.ACKNOWLEDGEMENTS**

With Special Gratitude And Thanks For, All The 'Study Material Resources' Consulted, Every Involved Personnel In The Surgical/ Anaesthesia (Seniors & Colleagues), Para-Medical Staff Team Especially Radio-Diagnostic Personnels, For Constant Co-Operation Throughout, Managing Hundreds Of Patients, In Available Resources Circumstances, Sometimes In Very Difficult Situations, During Last More Than (2) Decades.

**Dr. (Mrs) Poonam Sahni M.B.B.S, D.G.O (Gold Medalist)** For Her Accompaniment During 'Scientific Presentation' Of Scientific Study & Constant Co-Operation Throughout.

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