

EMBOLIC AGENTS

ABSORBABLE MATERIALS

NON-ABSORBABLE MATERIALS

ABSORBABLE MATERIALS

AUTOLOGUS BLOOD CLOT

MODIFIED AUTOLOGUS BLOOD CLOT

OXIDISED CELLULOSE [OXYCEL]

GELFOAM

GELFOAM POWDER

NON-ABSORBABLE MATERIALS

PARTICULATE MATERIALS

- * AUTOLOGUS FAT & MUSCLE
- * POLYVENYL ALCOHOL PARTICLES
- * AVITENE
- * ANGIOSTAT
- * SURGICAL SUTURES
- * PULSAR PARTICLES
- * CELLULOSE POROUS BEADS
- * SILASTIC SPHERES AND SILASTIC WITH STEEL BALLS
- * STAINLESS STEEL PALLETS
- * FERROMAGNETIC MICROSPHERES
- * ACRYLIC SPHERES
- * METHYLMETHACRYLATE SPHERES

MECHANICAL EMBOLIC AGENTS

- * PLATINUM MICROCOILS
- * STAINLESS STEEL COILS
- * ELECTROLYTICALLY DETACHABLE PLATINUM
MICROCOILS
- * MECHANICALLY DETACHABLE COILS
- * LIQUID COILS
- * SILK STREAMERS
- * PLASTIC BRUSHES
- * SPIDERS
- * DETACHABLE BALLOONS

LIQUID EMBOLIC AGENTS

- * CYANOACRYLATES
- * METHYLMETHACRYLATE
- * 2-HYDROXYMETHYLMETHACRYLATE
- * DEHYDRATED ETHANOL
- * SOTRADECOL
- * ETHIBLOC
- * HYDROGELS
- * COPOLYMERS
- * EVAL
- * FIBRIN GLUE
- * BOILING CONTRAST
- * PLASTICS
- * ONYX

ABSORBABLE MATERIALS

AUTOLOGUS BLOOD CLOT

MOST WIDELY USED AUTOLOGUS MATERIAL

DURATION OF OCCLUSION IS VARIABLE > 48 HRS

AFTER 2 WEEKS > 50 % RECANALISED

USES : FOR TEMPORARY OCCLUSION

FOR PROXIMAL OCCLUSION TO PRESERVE
CAPILLARY BEDS

ADVANTAGE : LOW COST , LOW TOXICITY

DISTAL CLOT MIGRATION UNKNOWN

DISADVANTAGE : RAPID LYSIS

UNSUITABLE FOR RX OTHER THAN
HAEMORRHAGE AND FISTULAE

RX FOR CHOICE FOR SEVERE BLEEDING AFTER BIOPSY OF
KIDNEY AS RAPID CLOT LYSIS
PREVENTS RENAL INFARCTION

MODIFIED AUTOLOGUS BLOOD CLOT

CLOT MIXED WITH THROMBIN

E-AMINOCAPROIC ACID

OXIDISED CELLULOSE [OXYCEL]



RETARDS CLOT LYSIS



BETTER EMBOLIZATION

OXIDISED CELLULOSE [OXYCEL]

COTTONLIKE MATERIAL MADE FROM OX . CELLULOSE
ADDED TO BLOOD FOR FARMER CLOT
RECANALISATION WITHIN 4 MONTHS
HOW TO INTRODUCE : OXYCEL + CLOT



CUT INTO SMALL FRAGMENTS



ASPIRATE WITHIN 10 ML SYRINGE



INJECTED TO PLASTIC TUBING CONNECTED TO CATHETER



FLUSHED INTO VESSEL WITH DILUTE CONTRAST

GELFOAM

ABSORBABLE SPONGE MADE FROM GELATIN

SUPPLIED IN SHEETS; CUT INTO APPROPRIATE SIZES

FOR OCCLUSION OF SMALL TO MEDIUM SIZED VESSELS

FOR PROTECTION OF NORMAL VASCULAR TERRITORY

ACTION : CAUSES PANARTERITIS WITH LEUKOCYTE
INFILTRATION INTO VESSEL WALL

MAXIMUM TISSUE REACTION WITHIN 12 DAYS

RECANALIZATION OCCURS IN 7-30 DAYS

PREPARATION :

APPRO. SIZE GELFOAM PARTICLES + 30% CONTRAST



CLEAR GELLYLIKE SUBSTANCE



ASPIRATED WITH 10ML SYRINGE WITH NOZZLE UP



INJECTED INTO A TRANSPARENT TUBE CONNECTED TO
CATH



LOADED SYRINGE REPLACED WITH N/S SYRINGE

INJECTED INTO CATHETER

STOP INJ. AFTER ALL BRANCHES OCCLUDED

* NEVER EMBOLISE MAIN ARTERY WITH GELFOAM

* REFLUX MAY OCCUR

* RELIEVE WITH PAIN CON

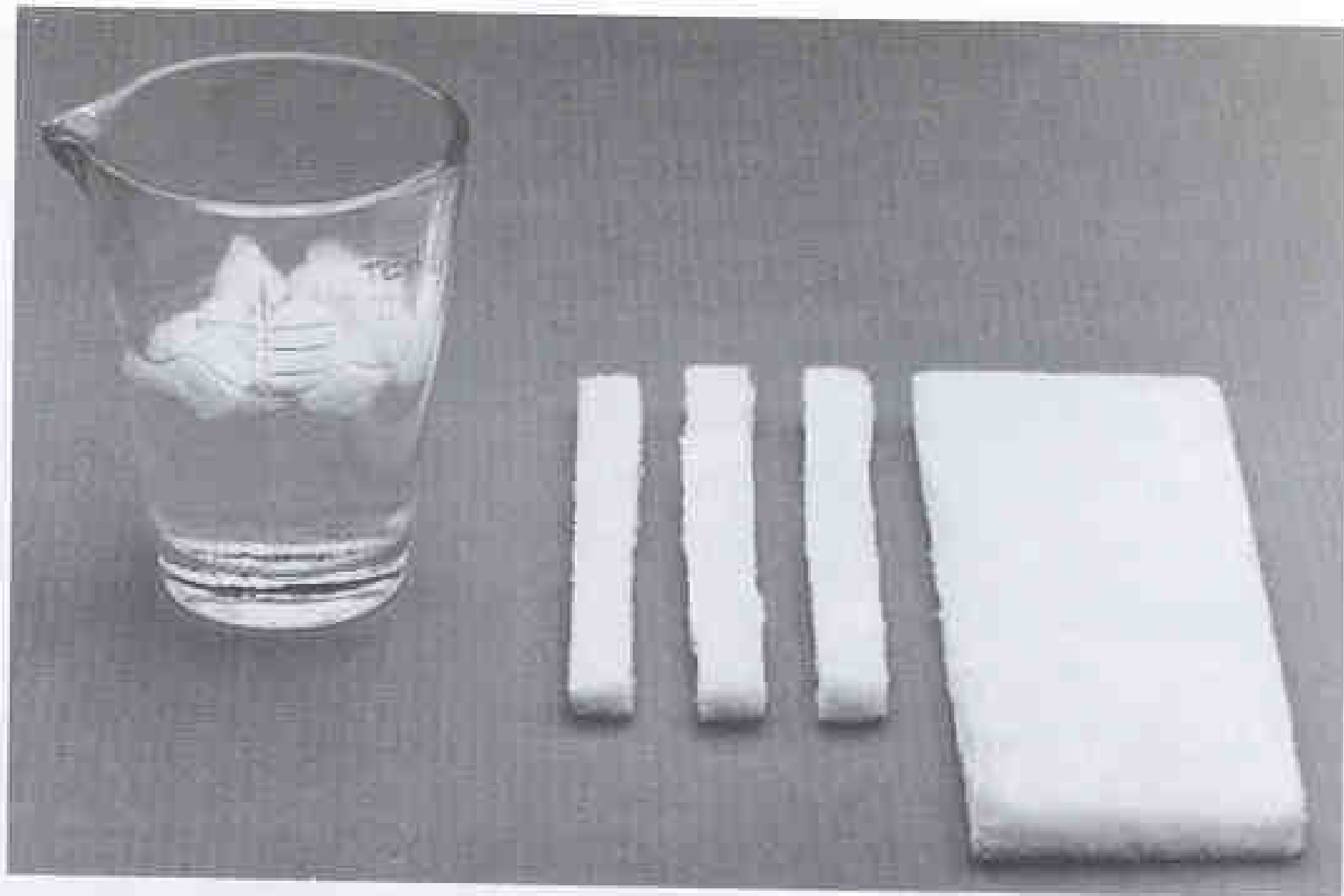


Figure 4.1.2. Gelfoam emboli cut with scissors into small fragments.

GELFOAM POWDER

CONSISTS OF PARTICLES OF DIFFERENT SIZES

[0-125; 125-315; 315-630 ; 630-800 MICRO MT]

FOR SMALL VESSEL EMBOLISATION { 100-200 MICRO MT }

DURATION OF OCCLUSION : 3-4 MONTHS

NOT FOUND 24-48 HRS POST EMBOLIZATION

USES : PRE OP. EMBOLISATION

CONTROL OF HAEMORRHAGE

DISADVANTAGE : ABLE TO PENETRATE CAPILLARY BED
AND CAUSES SEVERE ISCHAEMIA

SO ,

NOT USED IN GIT

NOT USED IN LARGE AVM ⇒ GOES TO LUNGS

NON ABSORBABLE MATERIALS

PARTICULATE MATERIALS

AUTOLOGUS MATERIALS

- * SKELETAL MUSCLES
- * FAT
- * DURA

DURATION OF VESSEL OCCLUSION NOT KNOWN
{ SEVERAL WKS TO MONTHS }

DISADVANTAGE : NEED TO BE HARVESTED FROM PATIENTS

SO, ADDITIONAL PROCEDURES NEEDED

POLYVINYL ALCOHOL PARTICLES

AVAILABLE IN VARIOUS SIZES

{ 50-150 , 150-250 , 250-350 , 350-500 , 500-750 , 750-1000 MICRON }

CAUSES INITIAL INFLAMMATORY REACTION FOLLOWED BY
GIANT CELL REACTION

THE PARTICLES MAY BE PERMANENT BUT THE
OCCLUSION MAY NOT BE.



Figure 1-50 Sizing of PVA particles made by ITC/Target Therapeutics (Contour Emboli). Note the irregularity of the particles themselves.

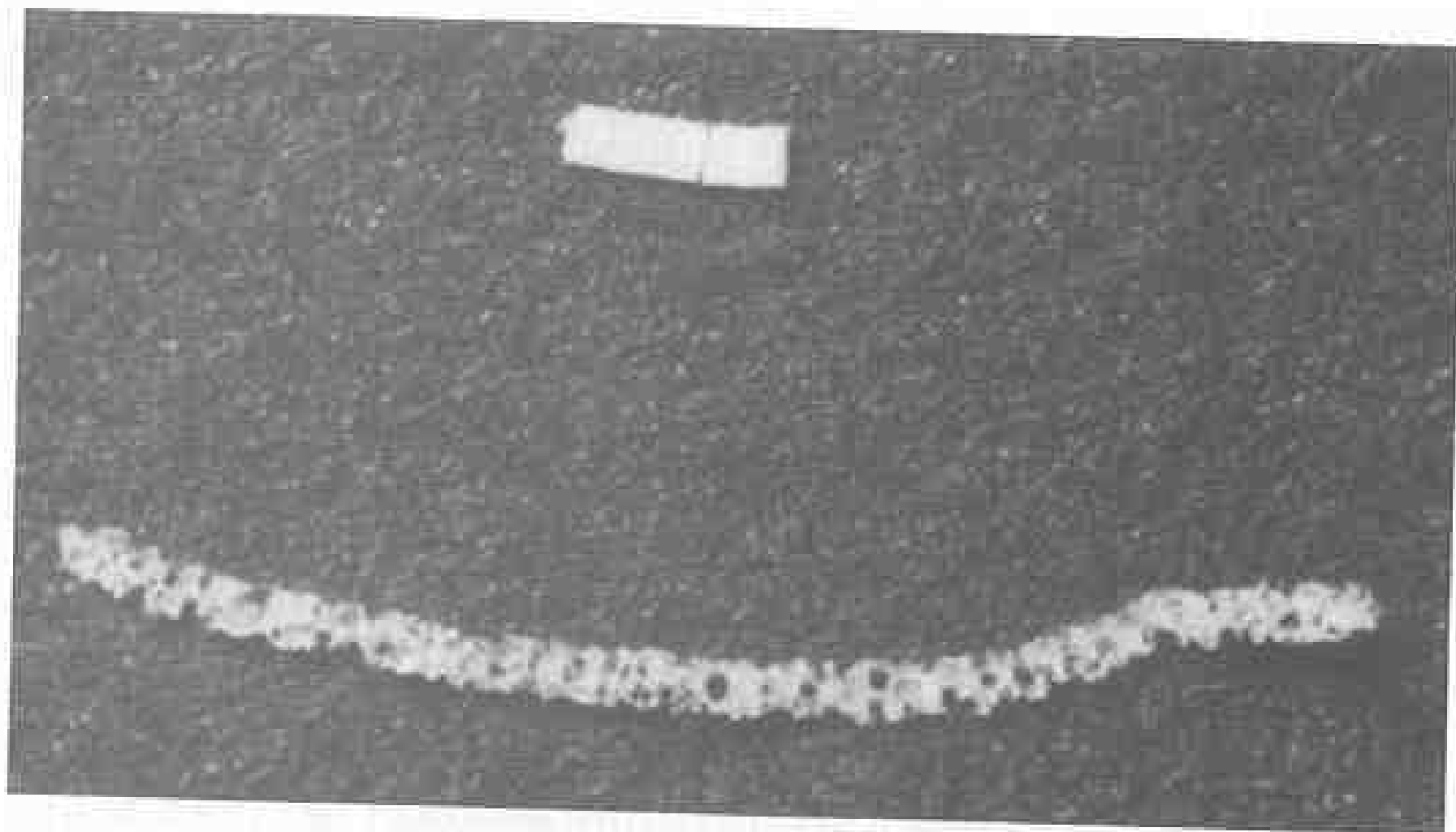


Figure 4.1.3. Ivalon plug in compressed (*top*) and reexpanded (*bottom*) forms.

AVITENE

COMPOSED OF MICROFIBRILAR COLLAGEN

BOVINE ORIGIN

PARTICLE SIZE – 75-150 MICRON

USED FOR SMALL VESSEL OCCLUSION

IT'S A TEMPORARY AGENT

FOR MORE PERMANENT OCCLUSION COMBINED WITH

* PVA

* ETHANOL

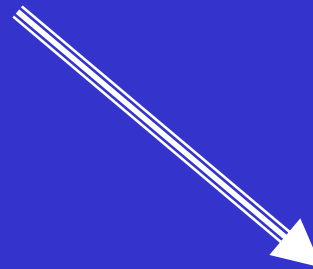
PRODUCES SIGNIFICANT ISCHAEMIA



DISTAL
MIGRATION



PLATELET
AGGLUTINATION



GRANULOMATOUS
ARTERITIS

ANGIOSTAT

GLUTARALDEHYDE CROSSLINKED MICROFIBRILLAR
COLLAGEN OF BOVINE ORIGIN

PARTICLE SIZE : 75 MICRON [AV.]

USE : SMALL VESSEL OCCLUSION

WORKS BY MECHANICAL OCCLUSION |

SURGICAL SUTURES

SILK OR POLYPROPYLENE SUTURES { 6-0 }

CUT INTO APPROPRIATE LENGTH {3-10 MM }

USED TO EMBOLISE SMALL FISTULAE

USED IN CONJUNCTION TO OTHER MATERIALS

SILK INCITES INTENSE INFLAMMATORY REACTION

PULSAR PARTICLES

MADE FROM PROPRIETARY HYDROGEL MATERIAL

CONTAIN TANTALUM FOR RADIOOPACITY

DELIVERED IN DESSICATED FORM

AFTER HYDRATION SWELL BY ABOUT 40 %

YIELD BENIGN TISSUE REACTION

PERMANENT , ONCE IN PLACE

SIZE RANGE – 150-1400 MICRON

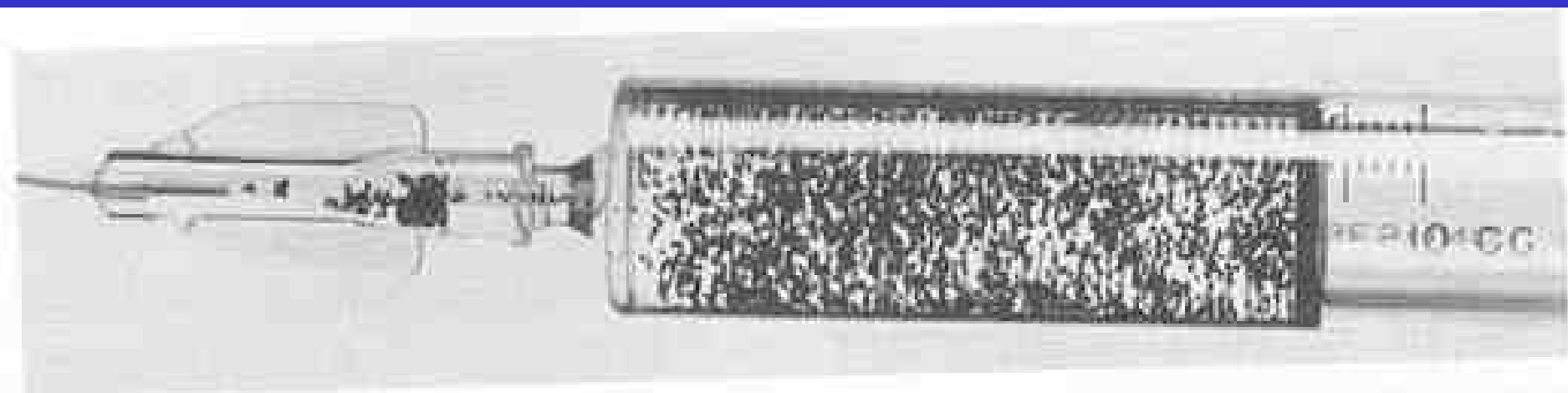


Figure 1-51 Pulsar embolization particles (Medtronic/MIS), which are optically and radiographically visible.

CELLULAR POROUS BEADS

SOLID EMBOLIC MATERIALS { +VELY CHARGED }

EXCEPTIONALLY UNIFORM IN SIZE

FLOW READILY

SP.GRAVITY SAME AS BLOOD

PENETRATE FAR INTO VESSEL TREE

ATTRACT -VELY CHARGED BLOOD COMPONENTS



THROMBUS FORMATION

HOMOGENEOUS DISTRIBUTION & TIGHT PACKING

NO INFLAMMATORY REACTION

OTHER NON- ABSORBABLE PARTICULATE MATERIALS

MICROSPHERES OF —

STAINLESS OR FERROMAGNETIC STEEL

ACRYLIC

METHYLMETHACRYLATE

SILASTIC

SILICONE

INERT , AVAILABLE IN DIFFERENT SIZES

RADIOOPAQUE

USE - AVM OF CNS

SILASTIC & SILICONE [LOW SP. GR.]



FLOATS



FLOW GUIDED DISTRIBUTION



ADVANT. FOR LESIONS WITH HIGH FLOW

{ HYPERVASCULAR TUMOR & AVMS }

MECHANICAL EMBOLIC AGENTS

PLATINUM MICROCOILS

AVAILABLE FROM : COOK , INC. [TORNADO , HILAL]
TARGET THERAPEUTICS [COMPLEX
HELICAL COILS]
CORDIS CORP. [TRUFILL PUSHABLE
COIL]

INITIALLY OBTAINED FROM DISTAL TIPS OF CORONARY
TYPE 0.014 INCH GUIDE WIRES

COULD BE INJECTED THRO 2.2 F COAXIAL TRACKER CATH

HIGHLY THROMBOGENIC , RADIOOPAQUE ,
BIOCOMPATIBLE , NON-FERROMAGNETIC

PLATINUM MICROCOILS

DIFFERENT SHAPES : STRAIGHT , CURVED , HELICAL
STRAIGHT FORM DELIVERED BY SALINE FLUSH
COMPLEX FORM REQUIRES COIL PUSHERS

WITH / WITHOUT SILK / DACRON FIBRES

THROMBOGENICITY DUE TO ADDED FIBRES

USES : CNS - ANEURYSMS

AVMS

PERIPHERAL EMBOLISATIONS

RADIOOPAQUE MARKER IN SURGERY IN SMALL
BOWEL ANGIODYSPLASIA

PLATINUM MICROCOIL

ADVANTAGES :

DO NOT REFLUX AS LIQUID EMBOLIC AGENT

DO NOT MIGRATE

DO NOT DEFLATE AS BALLOONS

MRI COMPATIBLE

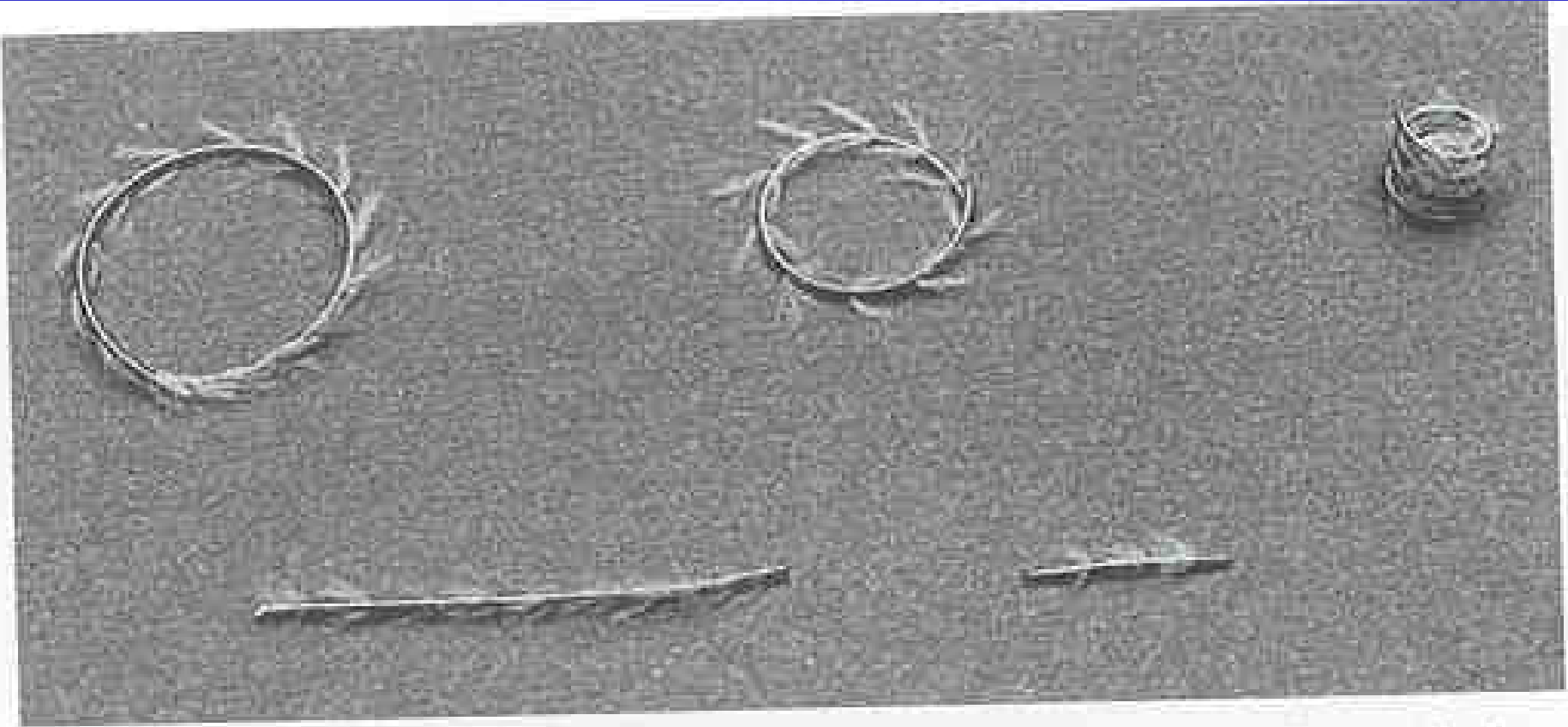


Figure 1-53 Hilal microcoils (Cook, Inc.) come in a variety of sizes, either straight or with simple cylindrical coil shapes.

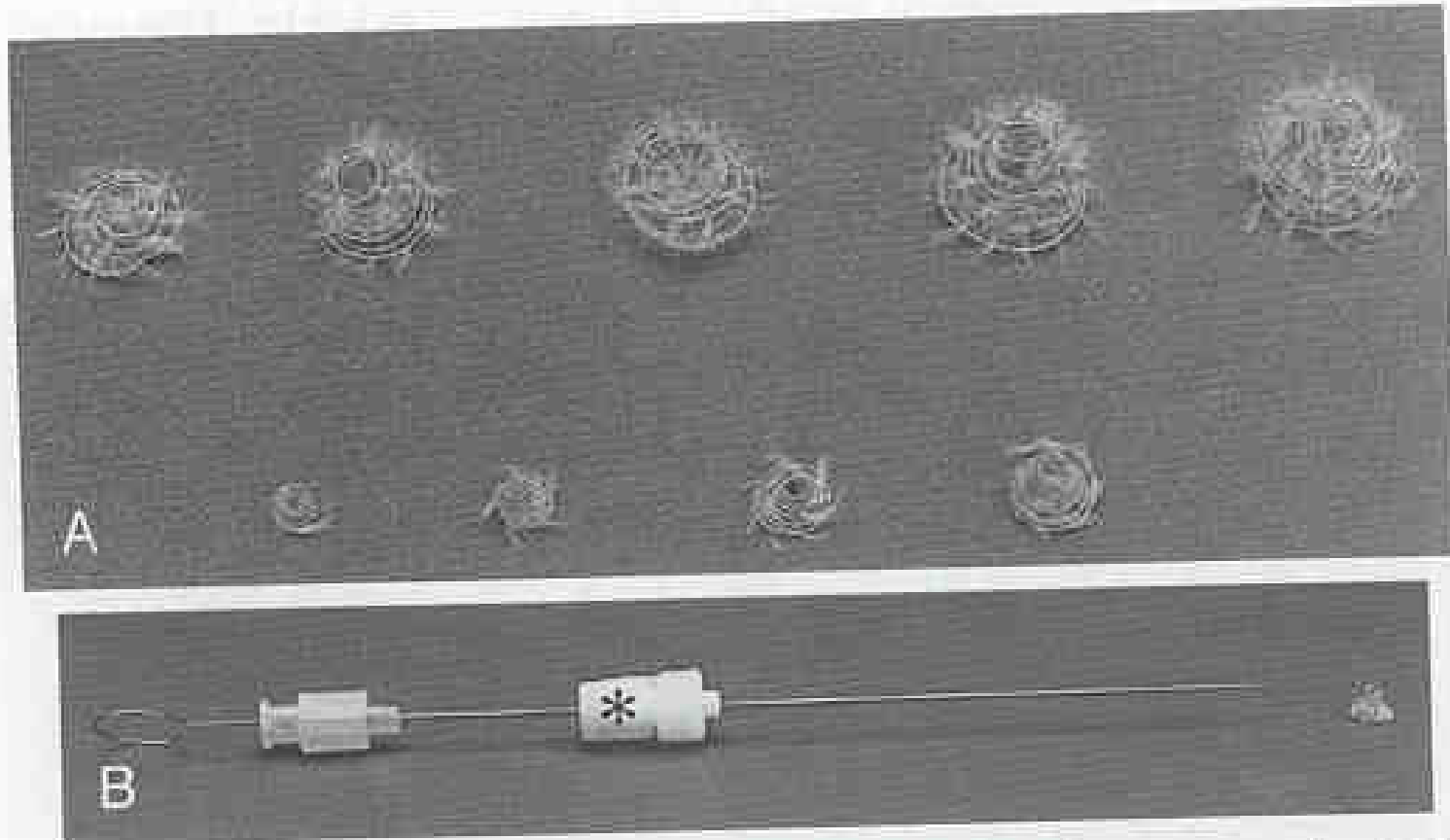


Figure 1-52 A and B, Tornado coils (Cook, Inc.) are complex and offer excellent deliverability and occlusion qualities. The sizes all taper in their spiral down to 2 mm and tend to fill the lumen of a vessel well. The larger the outer loop, the longer is the coil length, with a corresponding increase in the difficulty in pushing the coil down the lumen of a microcatheter, as is typical of all longer coils. Note the middle hub on the delivery device (*asterisk*); this is for locking the introducer to the hub of the microcatheter during delivery.

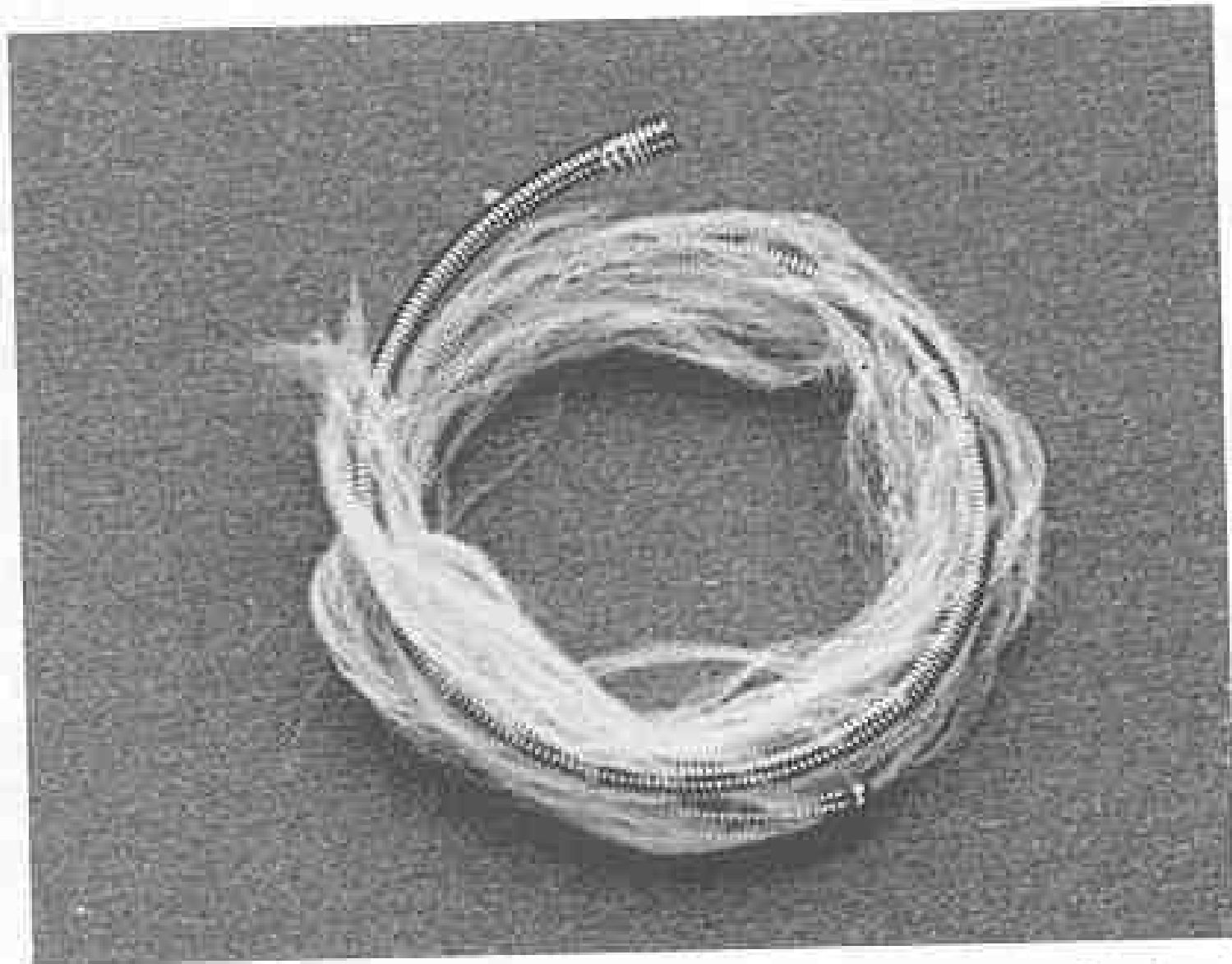
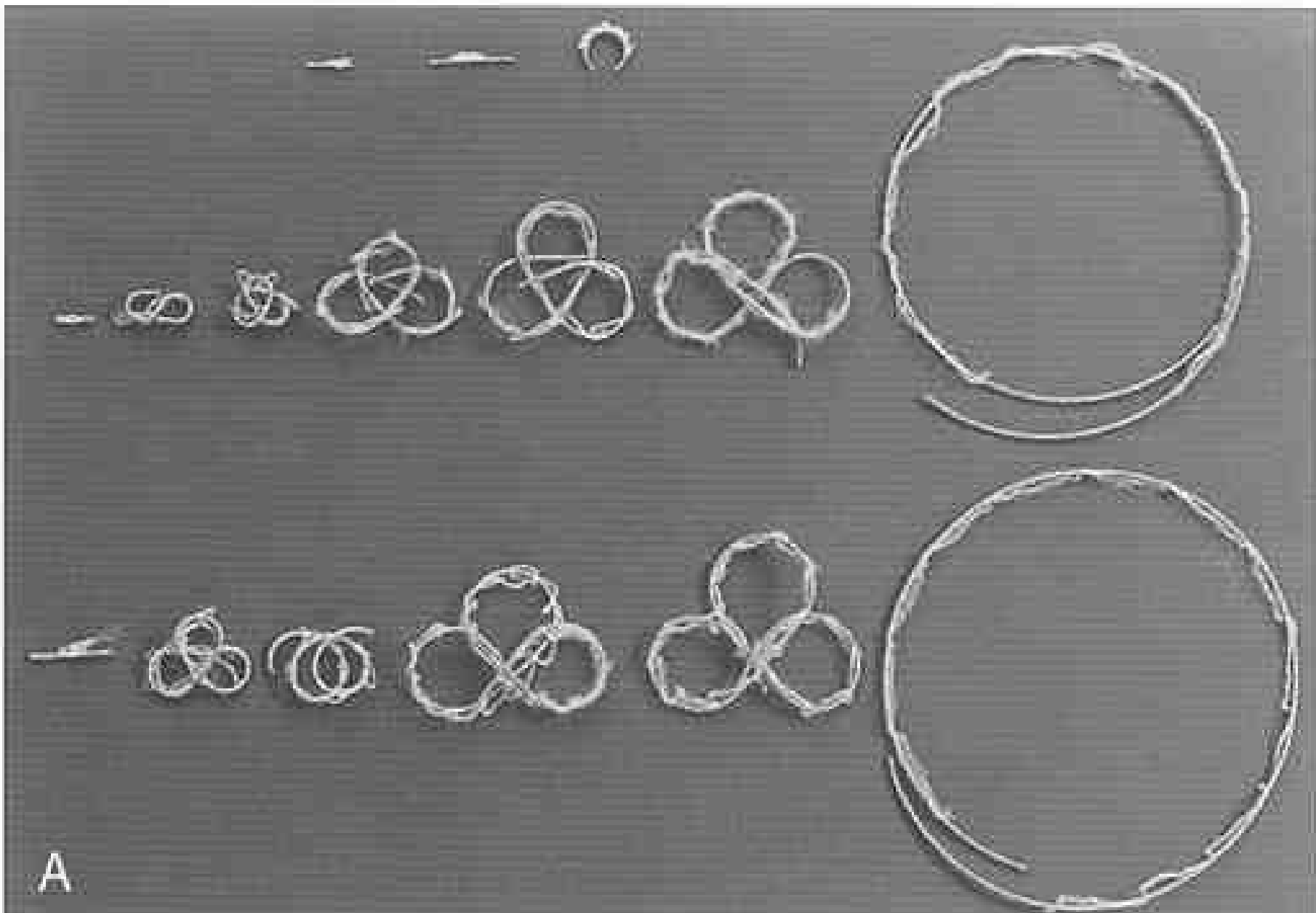


Figure 1-54 Large-size platinum microcoil (Cook, Inc.) used for vein of Galen occlusion.



A

STAINLESS STEEL COILS

INTRODUCED BY GIANTURCO & WALLACE

FOR PERMANENT OCCLUSION OF MAJOR ARTERIES

MACRO SIZED , ATTACHED ADCRON FIBRES

MORE THROMBOGENIC THAN PLATINUM COILS

PRESOAKING IN THROMBIN FURTHER THROMBOGENITY

VARIOUS SIZES AND SHAPES

LARGE SIZE REQUIRES LARGE DELIVERY CATHETER

[0.038 INCH]

DISADVANTAGE : MRI INCOMPATIBLE

STAINLES STEEL COILS

USES : LARGE VESSEL OCCLUSIONS

- * VOG MALFORMATIONS
- * DURAL SINUS ETC.
- * BLEEDING TUMORS
- * LARGE AV FISTULAE
- * OBLITERATIONS OF ESOPHAGEAL VARIX
- * OCCLUSION OF SYSTEMIC-PULMONARY SHUNTS IN CHD.

ELECTRICALLY DETACHABLE PLATINUM MICROCOILS

GUGLIELMI DETACHABLE COILS { GDC , TARGET TH. }

INVENTED BY GUGLIELMI { 1990 }, ITALIAN NEUROSURGEON

USED PRINCIPLES OF ELECTROTHROMBOSIS & E-LYSIS

VARIOUS SIZES AND SHAPES

GDC

HAS 4 COMPONENTS

PROX.175CM OF STAINLESS STEEL CORE WIRE

INT.5CM PLATINUM MARKER

THIRD SEG. 3 CM LONG TEFLON COATED STAINLESS STEEL
FOR ELECTRICAL INSULATION

DISTAL 4-40 CM LONG PLATINUM COIL

GDC

COIL HAS CIRCULAR MEMORY OF 2-18 MM DIAMETER
TO MATCH WITH MAXIMAL ANEURYSM DIAMETER

DC CURRENT INDUCES THROMBOSIS AROUND PLATINUM
COIL

ALSO CAUSES ELECTROLYSIS OF UNINSULATED SOFT
STAINLESS STEEL BONDING WITH PLATINUM COIL

DETACHMENT IS COMPLETE IN 1-5 MTS.

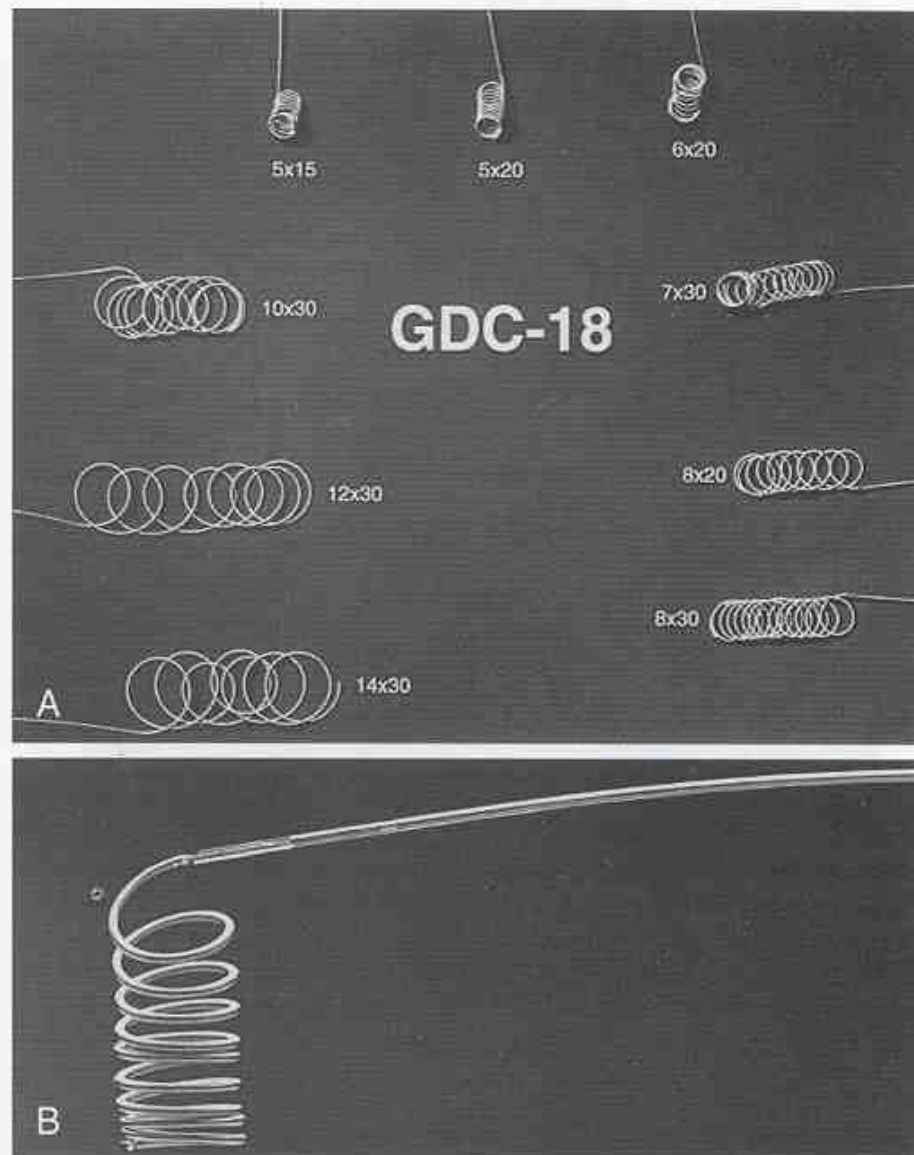


Figure 1-58 A and B, These detachable platinum coils (GDC) from Target Therapeutics are made in two diameters for use with the two primary microcatheter sizes and are available in numerous coil diameters to custom fit into individual aneurysms. They are easily extruded from the catheter and can be withdrawn back into the catheter just as easily.

MECHANICALLY DETACHABLE COILS

DEVELOPED BY TARGET TH. AND COOK INC.

COIL DETACH MECHANICALLY

EASIER TO USE

METHOD IS AN INTER LOCKING DEVICE OR
ELECTRICALLY CONTROLLED GRIPPING DEVICE

REPLACED BY GDCS

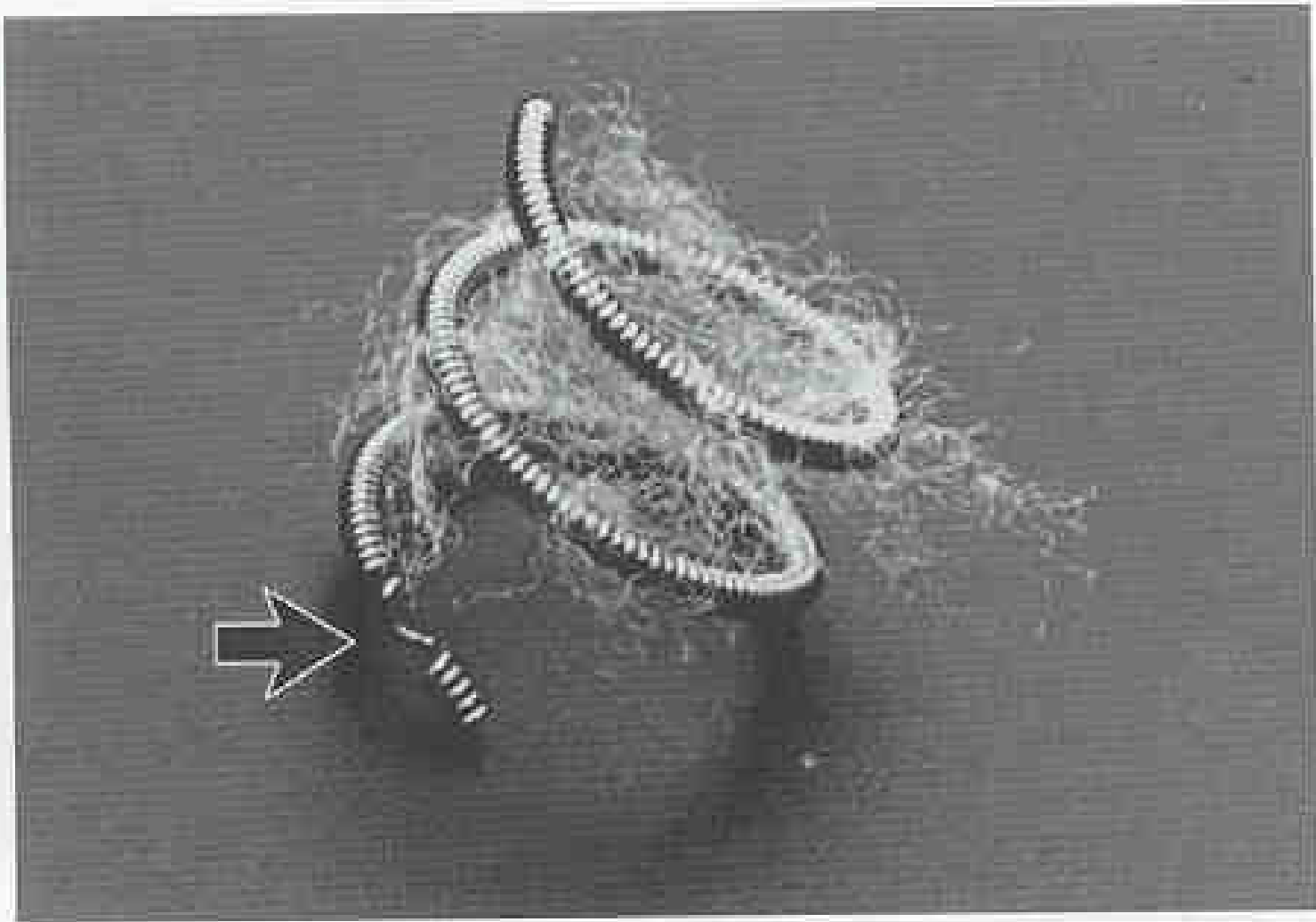


Figure 1-60 A mechanically detachable coil produced by Cook, Inc. These are made for use with catheters capable of accepting an 0.038" guidewire. Note the notch at one end of the coil (*arrow*). This is the site of engagement with the steering and release mechanism.

LIQUID COILS

MADE BY TARGET TH. AND ARE IN LIMITED RELEASE

MADE FROM EXTREMELY FINE PLATINUM COILS

VERY SUPPLE

INTENDED TO BE FLOW DIRECTED

USE : RX OF AVM IN CONJUNCTION WITH CYANOACRYLATE
TO REDUCE FLOW RATE OF AVM BEFORE GLUE EMB.

SILK TUFTS { STREAMERS }

MAINLY USED IN COMBINATION WITH COILS
FOR RAPID AND PERMANENT OCCLUSION

BIOCOMPATIBLE

PLASTIC BRUSHES

SMALL NYLON BRUSHES

SAFE FOR TRANSCATH. OCCLUSION OF LARGE ARTERY

ACTS BY MECHANICAL BLOCKAGE + SEC. THROMBOSIS

MILD INFLAMMATORY REACTION IN VESSEL WALL

SUITABLE FOR RX OF LARGE AV COMMUNICATION

DISADV. - LESS RADIO-OPAQUE

AMPLATZ VASCULAR OBSTRUCTING DEVICE

MADE BY COOK, INC. { SPIDERS }

DESIGNED TO SPRING OPEN IN A SHORT SPACE

LEGS ANCHOR VESSEL WALL { AS IVC FILTER }

FORMS A STABLE BASE FOR COILS

AVAILABLE IN VARIOUS SIZES FOR VESSELS UP TO
9 , 13 , 15 , 20 MM OF DIAMETER

SUPPLIED IN A KIT WITH A SHEATH , GUIDEWIRE ,
DELIVERY CATHETER { 8FR. } & POSITIONING GUIDEWIRE

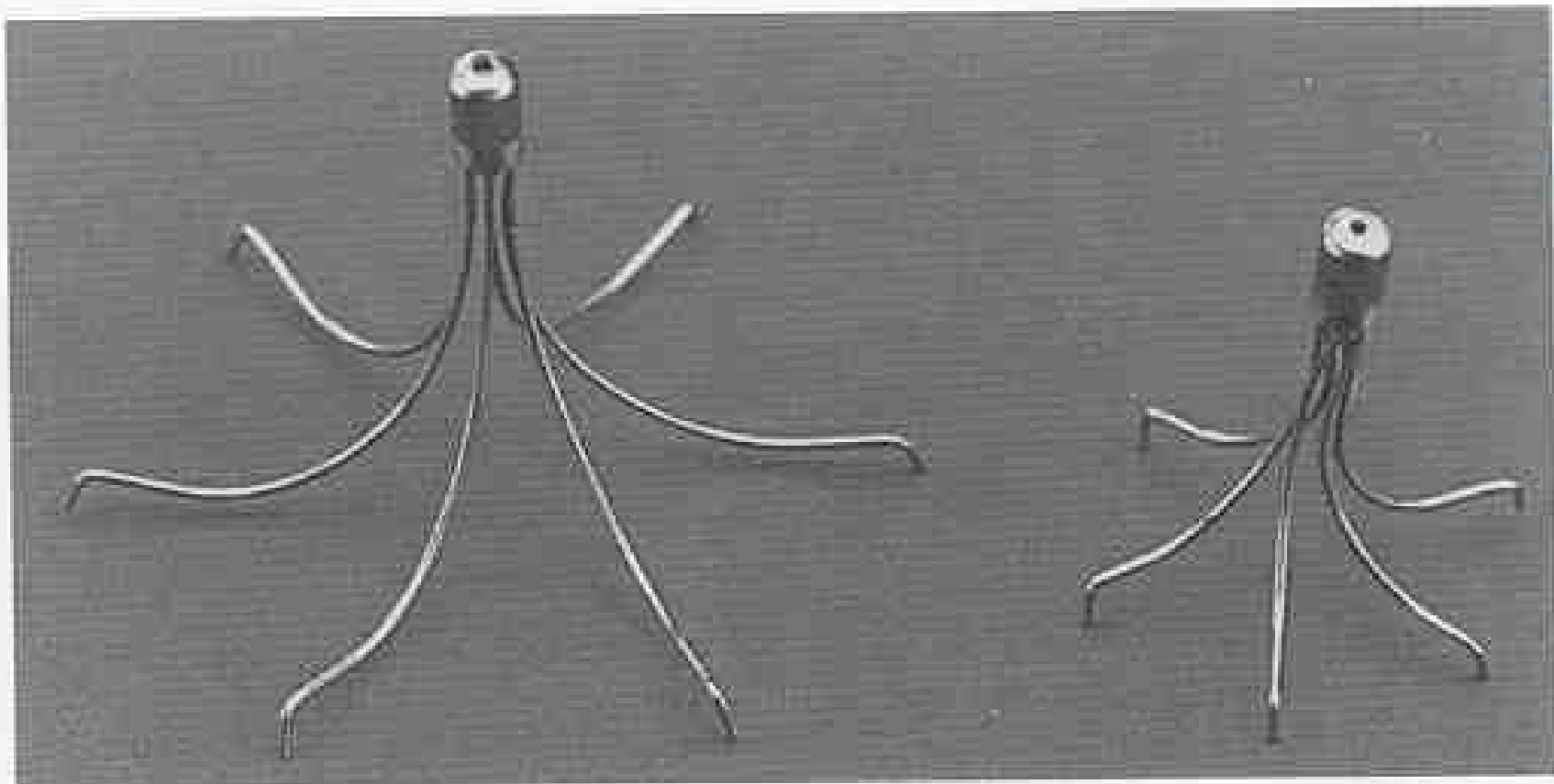


Figure 1-61 Amplatz vascular obstructing devices (spiders) (Cook, Inc.) are designed to deploy similarly to a Greenfield filter, with their legs anchoring to the walls of the blood vessel. They form a stable base for coil occlusion of the vessel, retaining the coils in position and preventing them from embolizing distally. They come in various sizes and are supplied as a kit that includes a sheath, guidewire, delivery catheter, and positioning guidewire.

DETACHABLE BALLOONS

MADE OF LATEX OR SILICONE { TARGET TH. }

HAVE SELF SEALING VALVES { SILICONE } OR
ATTACHED TO CATHETER & SEALED WITH LATEX STRING

SILICONE BALLOONS SEMIPERMIABLE
SO INFLATED WITH ISOTONIC CONTRAST MEDIA

LATEX ARE IMPERMIABLE

SILICONE SOFTER , DIFLATE MORE SLOWLY

VARIOUS SIZES AND SHAPES

CATHETER SHOULD BE ATLEAST 7-9FR FOR BALLOONS

DETACHABLE BALLOONS

ADVANTAGE : CARRIED BY BLOOD TO POSITION
{ FLOW DIRECTED }

EFFECT OF OCCLUSION CAN BE
TESTED BEFORE DETACHING THE
BALLOON

DETACHABLE BALLOONS

USES : NEURORADIOLOGY --- AVM , ANEURYSM

TRANSVENOUS OCCLUSION OF PULMONARY AVM

LARGE AVF

MAY BE USED IN CONJUNCTION WITH COILS

DISADVANTAGE :

HIGH COST

TENDENCY TO DEFLATE , MIGRATE

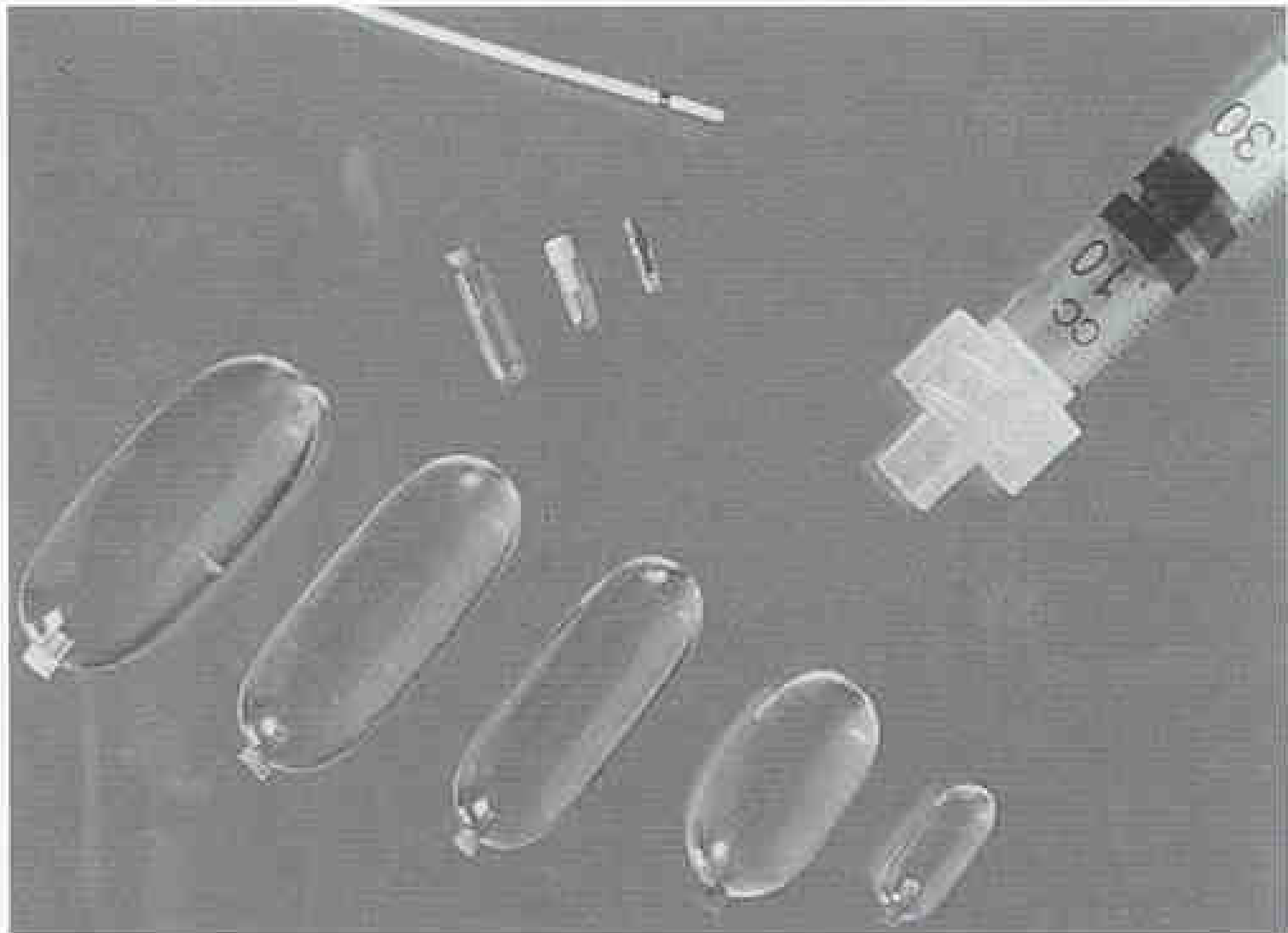


Figure 1-62 The detachable balloons manufactured by ITC/Target Therapeutics come in a variety of sizes and shapes and can be delivered with the pictured catheter or one supplied by Target Therapeutics. Their release strength also varies.

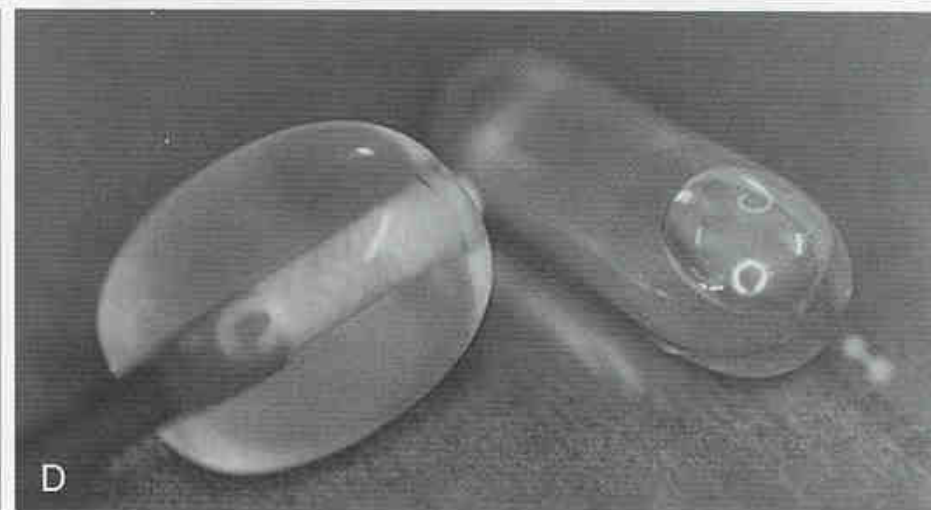
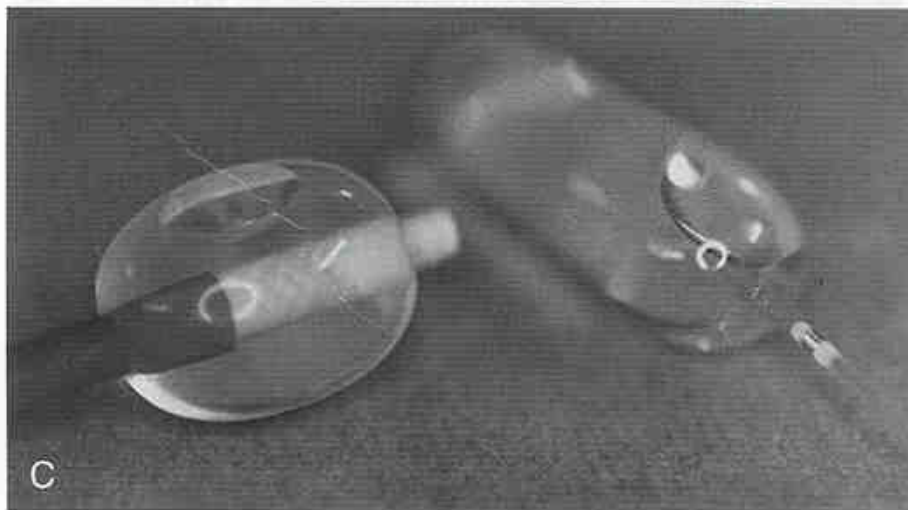
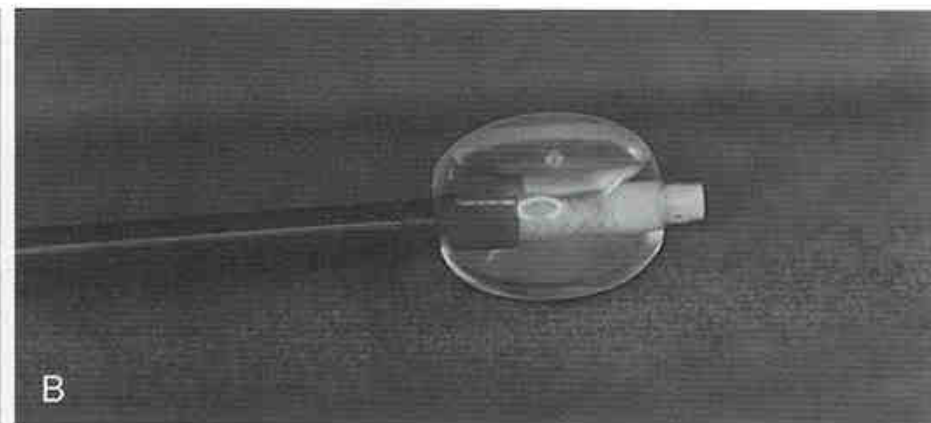
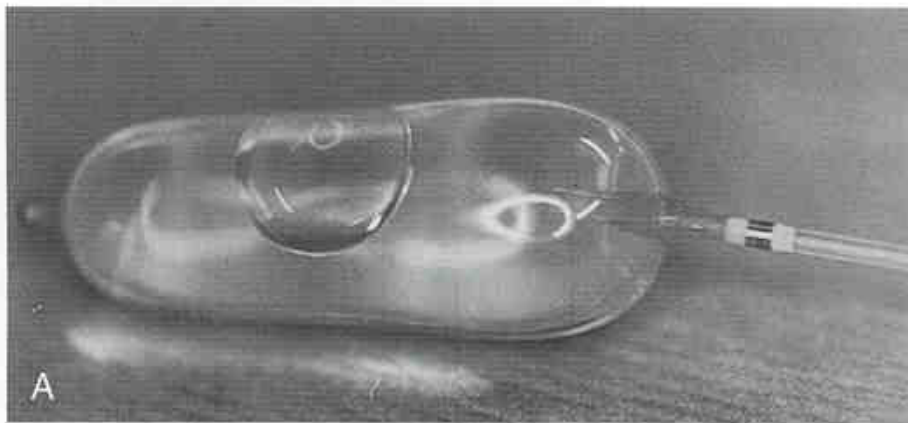


Figure 3-2 Demonstration of the difference between latex and silicone balloons. A shows a latex Gold Valve balloon mounted on the end of a TRACKER-18 extended-tip catheter, as described in Figure 3-1. Note the air bubble. This balloon must be purged before use. The venting tube microcatheter made by ITC/Target Therapeutics can be used for this purpose. In (B), the silicone balloon of a Zeppelin catheter (Medtronic/MIS) has been inflated. Again, note the bubble. In (C), note that the bubbles in the two balloons are approximately the same size initially. After a wait of 10 minutes, note that the air has disappeared from the semipermeable silicone balloon of the Zeppelin, while the bubble in the latex balloon is still the same size (D). The Zeppelin does not require the rigorous preparation that is needed when latex balloons are utilized; time performs the trick of purging the balloon.

LIQUID EMBOLIC AGENTS

CYANOACRYLATES { GLUE }

N-BUTYL-2-CYANOACRYLATE [HISTOACRYL] WIDELY USED

CAPABLE OF REACHING DISTAL SMALL VESSELS

REQUIRES SKILLFUL & CAREFUL HANDLING

EXP. TO IONIC SOLN. CAUSES POLYMERISATION

ADD. IOPHENDYLATE , GL.ACC.ACID , ETHIDOL → ↓ POLY.

OPACIFICATION BY ADD. OF TANTALUM POWDRE

PERMANENT AGENT FOR EMBOLISATION

GLUE

DISADVANTAGE :

RISK OF STROKE AND CR. N DISFUNCTION
DUE TO OCCLUSION OF UNDESIRED BRANCHES

OBSTRUCTION TO VENOUS OUTFLOW

CEMENTING OF CATHETER

POLYMERISATION \implies HEAT



ANGIONECROSIS

NEW CYANOACRYLATE

2-HEXYLCYANOACRYLATE { NEURACRYL }

SUPPLIED IN TWO VIALS

FIRST : PURIFIED LIQUID MONOMER { NEURACRYL }

SECOND : YELLOWISH BROWN MIXTURE OF
2-HEXYLCYANOACRYLATE POLYMER,
FINELY POWDERED [5 MICRON] GOLD,
BIOLOGICALLY METABOLIZABLE EFA

HOW TO USE :

PLACE MICROCATH. IN VESSEL
FIRST VIAL MIXED IN SECOND
SHAKE FOR 1 MINUTE
INJECT THROUGH CATH.

NEURACRYL

ADVANTAGE :

SINGLE VISCOSITY AGENT < HISTOACRYL

LESS ADHESIVENESS

BETTER CATH. WITHDRAWAL

HARDENS MORE PREDICTABLY IN ARTERIES

LESS CHANCE TO PENETRATE VEINS

METHYLMETHACRYLATE

USED IN ORTHOPAEDICS FOR JOINT PROS. PLACEMENT

VERTIBROPLASTY IN HAEMANGIOMA , METS ETC

PERCUTANEOUS ACCESS

TOOTHPASTELIKE MATERIAL POLYMERIZES TO
EXTREMELY HARD MASS

HEAT IS PRODUCED IN POLYMERIDATION

2-HYDROXYMETHYLMETHACRYLATE

IN 1980 HEMA WAS DESCRIBED AS POLYMERIZING AGENT

USED INSIDE DETACHABLE BALLOONS FOR PERMANENT
OCCLUSION

REACT WITH LATEX → RUPTURE → SO NOT USED

LOW VISCISITY , EASY INJ. THROUGH MICROCATH.

MIX WITH BLOOD/WATER , STILL BECOME 100% SOLID

IT DOES NOT EXPAND WHEN POLYMERISING AS HYDROGEL

DEHYDRATED ETHANOL

ABSOLUTE ETHYL ALCOHOL { 96 % }

EXTREMELY DANGEROUS AGENT

CYTOTOXIC REACTION TO TARGET ORGANS
AND

SCLEROSIS OF ARTERIAL WALLS \Longrightarrow THROMBOSIS

USED INTRA ARTERIALLY OR DIRECT PUNCTURE OF
LESIONS

IT IS PAINFUL

MIXED WITH CONTRAST FOR OPACIFICATION

SOTRADECOL

SCLEROSING AGENT

USED INTRA ARTERIALLY OR DIRECT PUNCTURE OF
LESION

PAINFUL AGENT

1 : 1 MIXTURE WITH NONIONIC CONTRAST MATERIAL

ETHIBLOC

MIXTURE OF CORN PROTEIN [ZEIN]
SODIUM AMIDOTRIZOATE
OLEUM PAPAVERIS
PROPYLENE GLYCOL IN 60% ALCOHOL SOLN

PROTEIN PRE. AND FORMS A GUMMY MASS

DISADVANTAGE : PAINFUL
VISCOUS , DIFFICULT TO USE WITH
MICROCATH.
CAPABLE OF DISTAL PENETRATION
INDUCES INFM. REACTION

COPOLYMERS

DEVELOPED BY MICROTHERAPEUTICS

DISSOLVED PLASTIC

SIMILAR TO CYANOACRYLATE

DELIVERED AS LIQUID

POLYMERISES TO FORM A RUBBERY MASS

DOES NOT PRECIPITATE AS FAST AS HYDROGELS

DOES NOT AS FAST AS CYANOACRYLATES

EVAL

MIX. OF ETHYLENE VINYL ALCOHOL COPOLYMERS AND
METRIZAMIDE POWDER DISSOLVED IN DMSO

IN BLOOD DMSO DIFFUSES EXTREMELY RAPIDLY

EVAL-METRIZAMIDE MIXTURE \Longrightarrow A SPONGY MASS



MECHANICAL OBSTRUCTION

LOW VISCISITY

PERMANENT AGENT

NO RISK OF GLUING CATH. IN PLACE

FIBRIN GLUE

MIXTURE OF : AUTOLOGUS CRYOPRECIPITATE
THROMBIN



SOLID FIBRIN CLOT

USED IN FACIAL AVMS

PLASTICS

STILL IN EXPERIMENTAL STAGE

WOULD BE DELIVERED IN LIQUID FORM

WOULD HARDEN AFTER DELIVERY

ANY PHYSICAL CHARACTERISTICS NECESSARY CAN BE
DESIGNED INTO THE MATERIALS

POTENTIAL USE COULD RANGE FROM AVM TO ANEURYSM

BOILING CONTRAST

EXPERIMENTAL STUDIES

CONTRAST HEATED TO BOILING

INJ. THRO. TEMPORARY OCCLUSION BALLOON CATH.

CATH. FLUSHED , BALLOON DEFLATED

COMPLETE OCCL. OF PREFERED TERRITORY WITH
COAGULATION NECROSIS & ARTERIAL THROMBOSIS

ADVANTAGE :

PENETRATE TO SMALL VESSELS

RAPIDLY RENDERED NONTOXIC BY COOLING

REQUIRES NO FURTHER OPACIFICATION

BOILING CONTRAST

DISADVANTAGE :

TECHNICALLY DIFFICULT

INFARCTION OF AFFECTED TERRITORY IS GRADUAL

TAKES DAYS/WEEKS FOR RESULT TO MANIFEST

INCR. DIST. FROM CATH. ; FLOW RATE RNDERS
MATERIALS INEFFECTIVE

AVAILABILITY OF FLOW CATHETER WITH FLOW
CONTROL MAY INCREASE THE USEFULNESS OF
THIS TECHNIQUE

HYDROGELS

HYDROGEL POLYMERS ARE AVAILABLE AS

- * LIQUID { 1 TO 10 % SOLUTION IN DMSO }

- * 100 – 1000 MICRON PARTICLES

FORMS SOFT SHAPELESS MASS WHEN EXP. TO WATER

NO INFLAMMATORY RESPONSE

PERMANENT AGENT

DONOT ATTACH TO VESSEL WALL

CAN BE DELIVERED EASILY THRO. MICROCATETER

A CAST OF VESSEL IS TO BE MADE FOR PROPER RETENTION

HYDROGELS

USES : AVMS
ANEURYSMS

FUTURE USE : AS EMBOLIC AGENTS
CATHETERS AS THEY ARE
LUBRICIOUS
SOFT
STRONG
EXTERMELY FLEXIBLE

ONYX

THE MICROTHERAPEUTICS ONYX SYSTEM CONSISTS OF :

- * 1.5 ML VIAL OF ONYX LIQUID EMBOIC MATERIAL
- * 1.5 ML VIAL OF DMSO
- * 3 MTI ONYX 1 ML DELIVERY SYRINGES

ONYX & DMSO ARE STERILE & NON-PYROGENIC

ONYX AND DMSO SHOULD BE STORED BETWEEN -20&55DC

ONYX IS DESIGNED FOR USE WITH A DMSO COMPATIBLE
MOCROCATHETER AS --- MTI FLOWRIDER
EASY RIDER
REBAR

ONYX

INDICATION : BRAIN AVM EMBOLIZATION

CONTRAINICATION : PREMATURE INFANT { < 1,500 GM }
DERANGED LIVER FUNCTION

POTENTIAL COMPLICATIONS :

HAEMATOMA AT ENTRY SITE

VESSEL PERFORATION

EMBOLI TO UNDESIRE SITE

VESSEL SPASM

PAIN & TENDERNESS

ISCHAEMIA

VASCULAR THROMBOSIS

ONYX

DIRECTIONS FOR USE :

- * USE ONLY MTI OMYX SYRINGE
- * USE ONLY MICROCATH. FROM MTI
- * SHAKE ONYX AT LEAST 20MTS ON AN ONYX MIXTURE



INADEQUATE SUSPENSION OF TANTALUM
AND INADEQUATE FLUOROSCOPIC VISUALIZATION

- * CONFIRM MICROCATH. PLACEMENT WITH CON. INJ.
- * FLUSH CON. FROM MICROCATH. HUB WITH 10 ML SAL.

ONYX

* FILLING OF CATHETER DEADSPACE :

- ASPIRATE 0.8 ML OF DMSO INTO 1ML SYRINGE
- INJ. INTO MICROCATH. AT A RATE < 0.3 ML/MT
TO DESIRED DEAD SPACE VOLUME



IF MICROCATH. LUER CONTAINS SALINE , BLOOD
OR CONTRAST , PREMATURE SOLIDIFICATION
OF ONYX OCCURS .

ONYX

- * FILL 1ML SYRINGE WITH ONYX THROUGH 18-20G N
- * REMOVE DMSO SYRINGE AND OVERFIL AND WASH THE LUER HUB WITH THE BALANCE OF DMSO
- * IMMEDIATELY CONNECT THE ONYX SYRINGE TO MICROCATH. HUB
- * POINT THE SYRINGE UPWARD
- * INJECT AT A STEADY RATE $< 0.3 \text{ ML / MT}$ WITH THUMB PRESSURE
- * AFTER THE ONYX PASSES THROUGH HUB INTO CATHETER HOLD THE SYRINGE HORIZONTAL
- * CONTINUE TO INJECT ONYX TO FLUSH THE DEAD SPACE VOLUME OF CATHETER

ONYX

- * ONCE ONYX EXITS THE DISTAL END OF CATHETER , MONITER THE VOLUME TO CORRESPOND TO THE VOLUME OF VASCULAR OF VASCULAR SPACE BEING FILLED
- * DON'T ALLOW OVER 1CM OF ONYX TO REFLUX BACK OVER CATHETER TIP
- * ON COMPLETION OF INJ. WAIT FOR A FEW SECONDS
- * GENTLY PULL THE CATHETER TO SEPARATE FROM ONYX MASS
- * IF ANY DIFFICULTY , WAIT FOR > 30 MTS , TRY AGAIN USE VASODILATOR TO REDUCE SPASM