RESULTS

RESULTS

Fifty two selected patients suffering from impotence suspected to be vasculogenic were the subject of this study, they were presentec to the outpatient clinic of Urology and Dermatology departments and referred to the Radiology department for assessment of both arterial and venous supply.

Age groups :

The age of our patients ranged from 25 to 68 years old with mean age 43 years. Distribution of patients according to age in years are demonstrated in table (1)

Age	No.	Percentage
20 - 29 years	5	9.5 %
30 - 39 years	16	30.5 %
40 - 49 years	17	32.5 %
50 - 60 years	13	25 %
> 60 years	1	2 %

Table 1. Age distribution.

As shown ir table (1), the higher incidence of vasculogenic impotence among the patients included in our study was at the 5 th decade of life (32.5 %) while the lower incidence was at the 7th decade of life (2 %)

Duration of impotence :-

The mean duration of impotence in our study was 2.9 years with a range of 0.6 -13 years. Distribution of patients according to duration of impotence are demonstrated in table (2)

Duration	No.	Percentage
< 1 year	5	9.5 %
1 year	14	27 %
2 years	15	28 %
3 years	7	13.5 %
> 3 years	11	21%

Table 2 Duration of impotence

As shown in table (2), the two years duration was the highest duration incidence in patients included in our study representing 28 %.

Etiological groups :

According to the etiology of vasculogenic impotence, our patients classified into three groups as shown in table (3)

Etiology	No.	Percentage
Venous leakage (venogenic)	41	80 %
Arterial insufficiency (Arteriogenic)	4	8 %
Mixed	3	6 %

Table 3 Etiological classification

Four patients (8%) were recorded to have normal arterial supply and normal venous drainage inspite of abnormal response to papaverine test.

Risk Factors :-

The presence of risk factors is recorded in this study; these factors include Diabetes mellitus, smoking and hypertension that may have relation to the vascular erectile dysfunction.

Only 29 patients (56 %) in our study had one or more of risk factors as shown in table (4) and (5) .

Risk factor	No.	%
Single	17	59
Multiple	12	41

Table 4

Risk factor	No.	%
Diabetes mellitus	10	59
Smoking	23	44
Hypertension	11	21

Table 5

Twenty-three patients in our study are smokers representing 44 %, nly 3 patients of them had arteriogenic impotence, 17 patients were venogenic and two patients have both arterial and venous factors.

Ten of our patients were diabetic, 6 of them had venous leakage, 3 patients showed pure arterial insufficiency and one patient have both factors.

Papaverine test :-

All the 52 patients were subjected to intracorporal injection of papaverine hydrochloride in graduated doses starting from 15 mg. up to 60 mg. The test was abnormal in 51 patients (98%) and no response recorded in only one case (2 %) Variable degrees of clinical response after papaverine injection are shown in table(6).

Response	No.	%
E0 : No response	1	2
E 1 : Elongation	10	19
E 2 : Partial tumescence	28	53.5
E 3 : Full tumescence	11	21.5
E 4 : Full erection	2	4
E 5 : Full rigidity	0	0

Table 6 **Distribution of patients according to clinical response to papaverine test.**

Four patients respond abnormally to papaverine injection proved later to have normal arterial and venous supply.

The remaining 48 patients were distributed according to the etiological diagnosis as shown table (7).

Response	Total No.	Venous Leakage		Arterial Insufficiency		Mixed	
		No.	%	No.	%	No.	%
E 0 : No Response	1	0	0	1	2	0	0
E 1 : Elongation	9	5	9.5	3	6	1	2
E 2 : Partial tumescence	28	26	50	0	0	2	4
E 3 : Full tumescence	9	9	19	0	0	0	0
E 4 : Full erection	1	1	2	0	0	0	0
E 5 : Rigid erection	0	0	0	0	0	0	0

Table 7 ***Distribution of patients with abnormal papaverine test according to the etiological diagnosis.***

where is the SD ??

The onset of action of papaverine ranged from 2 minutes to 23 minutes with a mean of 9.3 minutes while the duration of action of papaverine ranged from 12 minutes to 53 minutes with a mean of 21.7 minutes.

Measurements of PBI :

All our patients were examined by Doppler ultrasound and PBI was calculated for each patient. The findings are shown in table (8) .

PBI	No.	%
< 0.7	8	15.4
> 0.7	44	84.6

Table 8 Findings in PBI determination

Eight patients were diagnosed provisionally by PBI as arteriogenic impotence, when confirmed by duplex sonography and arteriography, only6 patients represents 75 % proved to have bilateral arterial insufficiency. So, the accuracy rate for PBI in our study was 75 %.

Duplex sonography :

All 52 patients were subjected to color duplex Doppler sonography and three main parameters were recorded for each cavernosal artery:

1.

1. Change in cavernosal artery diameter.
2. Peak systolic veolcity (PSV)
3. End diastolic velocity (EDV)

1- Change in diameter :

The change in diameter of right cavernosal artery ranged from 45 % to 120 % with a mean of 96.1 % while the change in diameter of the left cavernosal artery ranged from 45 % to 120 % with a mean of 94.1 %.

2- Peak systolic velocity :-

According to the threshold for normal arterial supply (25 cm/sec.) We classified our patients into two groups as shown in table (9)

PSV	Right artery		Left artery	
	No.	%	No.	%
< 25 cm/sec	7	13.5	6	11.5
>25 cm/ sec	45	86.5	46	88.5

Table 9 classification of patients according to the recorded PSV.

Although maximum peak systolic velocity (PSV) was reached within the first 5 minutes in most of the 52 patients, a 25 patients (48%) achieved maximum systolic velocity in the 6 to 25 minutes time range, 15 of these 25 patients (60 %) had velocities exceeding 25 cm/ sec only after 5 minutes. The range

of systolic velocities was 12.5 -70 cm/ sec for the left artery and 16-69 cm/sec for the right artery and the mean time to maximum peak systolic velocity was 6 minutes.

Significant asymmetry of systolic velocities between the left and right cavernosal arteries was found in 2 patients (4%).

The means PSV for each etiological group of vascular impotence was calculated and presented in table (10)

Etiology	Right artery	Left artery
Venous leakage	36.1 cm/sec.	63.3 cm/sec
Arterial insufficiency	18.7 cm/sec	16.7 cm/sec
Mixed	22.1 cm/sec	19.7 cm/sec

Table 10 ***Mean PSV in different etiological groups of vascular impotence***

3- End diastolic velocity EDV :-

According to the threshold of intact veno occlusive mechanism (5 cm /sec) we classified our patients into two groups as shown in table (11) .

E D V	Right artery		left artery	
	No	%	No	%
< 5 cm / sec .	5	9.6	5	9.6
>5 cm / sec	47	90.4	47	90.4

Table 11 Classification of patients according to EDV.

Only 5 cases showed EDV less than 5 cm/sec, proved by cavernosometry to have no venous leakage representing 100 % accuracy in diagnosis of normal venous mechanism by duplex sonography. The remaining 47 patients recorded velocity more than 5 cm/sec, 45 patients of them proved by cavernosometry to have venous leakage by percentage of 95.7% accuracy for diagnosis of venous leakage by duplex sonography.

The mean EDV for each etiological factor of vascular impotence was calculated and presented in table (12).

Etiology	Right artery	Left artery
Venous leakage	10.3 cm/sec.	11 cm/sec.
Arterial insufficiency	2.6 cm/sec.	1 cm/sec.
Mixed	9 cm/sec.	9 cm./sec.

Table 12 Mean EDV in different etiological groups of vascular impotence.

Cavernosometry:

All our patients were examined by cavernosometry and the following parameters were recorded post papaverine injection:

1-Initial intracorporal pressure.

2-Induction flow rate for erection.

3-Maintenance flow rate for erection.

4-Drop in pressure 5 minutes post infusion stoppage.

1-Initial intracorporal pressure (I.C.P):

According to the recorded initial intracorporal pressure 10 minutes post papaverine injection, we classified our patients into three groups as shown in table (13).

Group	I.C.P	Total Number	%	Normal		Mild venous leakage		Moderate venous leakage		Severe venous leakage	
				No.	%	No.	%	No.	%	No.	%
G.1	20-29 mmHg	15	29	3	20	0	0	1	7	11	73
G.2	30-40 mmHg	26	48	1	4	9	35	10	38	6	23
G.3	> 40 mmHg	11	23	4	36	4	36	2	18	1	9

Table 13 Classification of Patients according to the recorded ICP .

From table 13:

1-The majority of our patients (26 cases) included in the second group where the recorded ICP between 30 and 40 mmHg.

2-Most of patients proved to have severe venous leakage included in group 1 where the recorded I.C.P from 20 to 29 mmHg, while patients of mild venous leakage or have normal veno-occlusive function included in group 3 where the recorded I.C.P more than 40 mmHg.

2-Induction flow rate for erection I.F.R:

The normal value of I.F.R for erection was from 30-40 ml/minute. In our study, we recorded I.F.R ranged from 25 to more than 180 ml/ minute. Three patients have failure to induce erection with more than 240 ml/minute.

We classified our patients into 4 groups according to the recorded IFR as shown in table (14)

Group	I. F. R.	Total No.	%	Normal		Mild venous leakage		Moderate venous leakage		Severe venous leakage	
				No.	%	No.	%	No.	%	No.	%
G.1	< 40 ml/ min	3	6	3	100	0	0	0	0	0	0
G.2	40-60 ml/ min	6	12	3	50	3	50	0	0	0	0
G.3	61-100 ml/ min	24	46	1	4	10	42	10	42	3	12
G.4	>100 ml/ min	19	37	1	5	0	0	3	16	15	79

Table 14 Classification of Patients according to the I.F.R for erection

From table 14:

1-Twenty four cases included in the group 3 where the recorded I.F.R. was from 60 to 100 ml/minute.

2-All patients have I.F.R. less than 40ml/minute proved to have normal veno-occlusive mechanism.

3-Most of the cases included in group 4 (IFR>100ml/minute) proved to have severe venous leakage. Only one case have more the 100ml/minute I.F.R. proved to have normal venous system.

3-Drop in pressure

Drop of I.C.P. to less than 50 mmHg. 5 minutes postinfusion stoppage is indicative of venous leakage. So, we classified our patients into two groups according to drop in pressure as shown in table (15).

Group	Drop in pressure	Total No.	%	Normal		Mild venous leakage		Moderate venous leakage		Severe venous leakage	
				No.	%	No.	%	No.	%	No.	%
G.1	> 50 mmHg	8	16	7	88	1	12	0	0	0	0
G.2	<50 mmHg	44	84	1	2	12	27	13	31	18	40

Table 15 Distribution of patients according to drop in pressure 5 min postinfusion stoppage

4-Maintenance flow rate MFR:

- Maintenance flow rate greater than 5ml/min is indicative of venous leakage.
- Venous leakage was classified into:

1-Mild venous leakage when the recorded MFR from 5-15 ml/minute.

2-Moderate venous leakage when the MFR reaches 25ml /minute.

3-Severe venous leakage where MFR is greater than 25ml /minute.

Our patients were classified into 4 groups according to the recorded MFR as shown in table (16).

Failure of induction was noticed in 3 cases. So, MFR could not be calculated and these cases considered having severe venous leakage.

Group	MFR	Total No.	%	Normal		Mild venous leakage		Moderate venous leakage		Severe venous leakage	
				No.	%	No.	%	No.	%	No.	%
G.1	< 5 ml/ min	5	9.5	5	100	0	0	0	0	0	0
G.2	5-15 ml/ min	4	7	3	75	1	25	0	0	0	0
G.3	16-25 ml/ min	21	40	0	0	12	58	8	38	1	4
G.4	> 25 ml/ min	22	43	0	0	0	0	5	22	17	78

Table 16 Classification and distribution of patients according to the recorded MFR.

Cavernosography:

Forty-four case men in this study have cavernosometric criteria of venous leakage and subjected to cavernosography.

Two cases showed corporeal filling defects proved by ultrasonography to be fibrous plaques. (Peyronei's disease).

The glans penis was opacified in 11 case (21%) while corpus spongiosum opacified in only 2 cases (4%).

The right internal pudendal vein opacified in 14 cases while 6 cases demonstrated opacification of left internal pudendal vein. Both left and right veins were filled with contrast in7 cases.

Right vesical vein opacified in 6 cases and the left in 3 cases while both veins filled with contrast together in 5 cases.

The right internal iliac vein filled with contrast in 26 cases while the left filled i 4 cases . Both veins opacified in 8 cases.

Right common iliac vein opacified in 10 cases while the left opacified in 3 cases. Both veins filled with contrast in only 2 cases.

I.V.C. was opacified in only 2 cases.

Saphenous vein opacified in one case.

Forty-Four cases of our study demonstrate venous leakage through different venous systems as shown in table (17).

Venous System	No.	%
1.Superficial venous system.	0	0
2.Intermediate venous system.	3	7
3.Deep system.	7	16
4.Intermediate and deep venous systems.	3	7
5.Deep and superficial venous systems.	15	35
6.Superficial, deep & Intermediate venous systems.	9	21
7.Superficial and intermediate venous systems.	7	16

Table 17 Showed listribution of patients according to the leaking venous system.

From Table 17:

1.The majority of patients demonstrated leakage through deep system in 34 cases (79 %) whether alone (22 case) or combined with intermediate system (12 cases).

2.Leakage through intermediate system was demonstrated in 21 cases (48%) whether alone in 9 cases or combined with deep system in 12 cases.

3.Superficial system (not sharing in erection process) was opacified in 30 cases. (70%).

Arteriography:

Seven cases of this study suspected to have arterial insufficiency by duplex sonographic examination. Not all these patients agreed to undergo penile angiogram . All of them were subjected to cavernosometry, 3 of them demonstrated venous leakage suggesting mixed arteriogenic and venogenic impotence. The remaining 4 cases with normal venous system were subjected to arteriographic examination.

The first case was examined by bilateral selective internal iliac arteriography, showed occlusion at the origin of both common penile arteries with non opacification of both dorsal and cavernosal arteries.

The remaining three cases were examined by non selective iliac arteriography and the following results were recorded:

1-Non opacification of common penile arteries in two cases.

2-Attenuation and atherosclerotic changes in internal iliac arteries in two cases.

3-Occlusion of lower abdominal aorta and both common iliac arteries in one case.

4-Filling of both dorsal arteries in one case.

CASE PRESENTATION

CASE 1

Clinical History :

38 years old man suffering from mild erection unable for penetration since 1 year.

Papaverine Test :

Partial tumescence E2

Doppler For PBI :

Suggestive of normal arterial supply
Right Cavernosal artery = 0.89
Left Cavernosal artery = 0.89

Duplex Sonography : (Fig. 29-A)

Suggestive of normal arterial supply with suspected venous leakage

Right PSV	= 33.6	cm/sec.
Right EDV	= 11.2	cm/sec.
Left PSV	= 34.5	cm/sec.
Left EDV	= 7.5	cm /sec.

Cavernosometry :

Failure of induction by rate of 240 ml/minute suggesting severe venous leakage.

Cavernosography : (Fig. 29-B)

Venous leakage via deep venous system with opacification of :

1.Crural veins.
2.Right and Left vesical plexuses.
3.Rt. internal pudendal vein .
4.Left internal iliac vein .
5.Superficial dorsal and bilateral external pudendal veins.

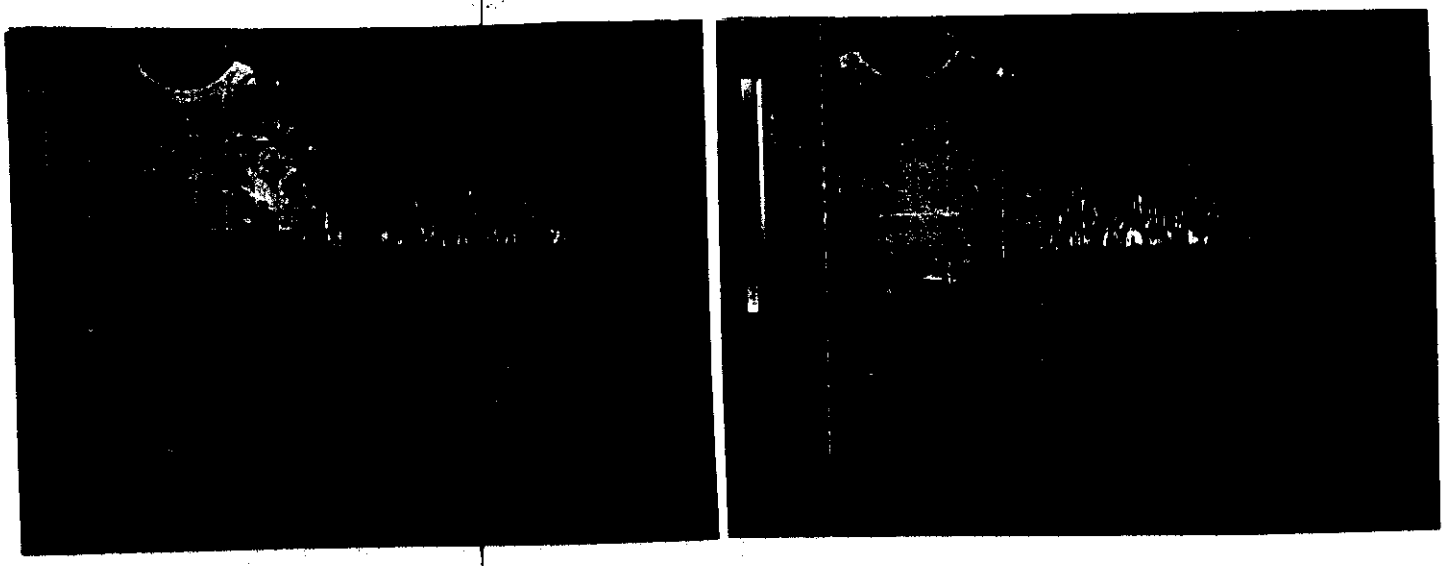


Fig . 29 (A)

Duplex sonography of both right and left cavernosal arteries demonstrating peak systolic and end diastolic velocities .

Fig 29 (B)

Cavernosogram showing severe venous leakage with opacification of crural veins (short arrow) vesical plexus (longe arrow), right internal pudendal (arrow head) and left internal iliac vein .

CASE 2

Clinical History :

28 years old man suffering from mild erection unable for penetration since 2 years.

Papaverine Test :

Partial tumescence E2

Doppler For PBI :

Suggestive of normal arterial supply
Right Cavernosal artery =0.82
Left Cavernosal artery = 0.79

Duplex Sonography : (Fig. 30-A)

Suggestive of venous leakage

Right PSV	= 29	cm/sec.
Right EDV	=7.7	cm/sec.
Left PSV	= 25.5	cm/sec.
Left EDV	=8.6	cm/sec.

Cavernosometry :

Severe venous leakage through the following parameters :.
Initial ICP = 30 mmHg.
IFR = 160 ml/min.
MFR = 80 ml/min.
Drop in pressure 5 minutes postinfusion stoppage = from 100 to 25 mmHg.

Cavernosography : (Fig. 30-B)

Venous leakage via intermediate (Deep dorsal v.) and deep (crural v.) systems with opacification of the left internal pudendal and superficial dorsal vein.

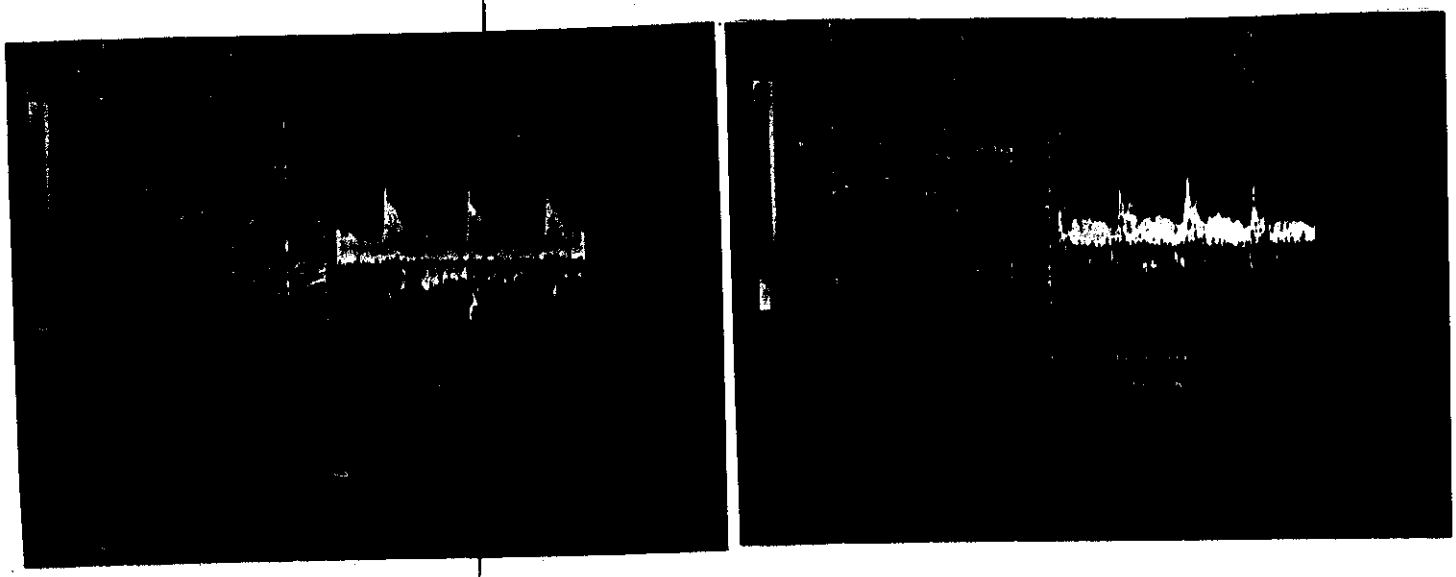


Fig . 30 (A)
Duplex sonography of both cavernosal arteries .

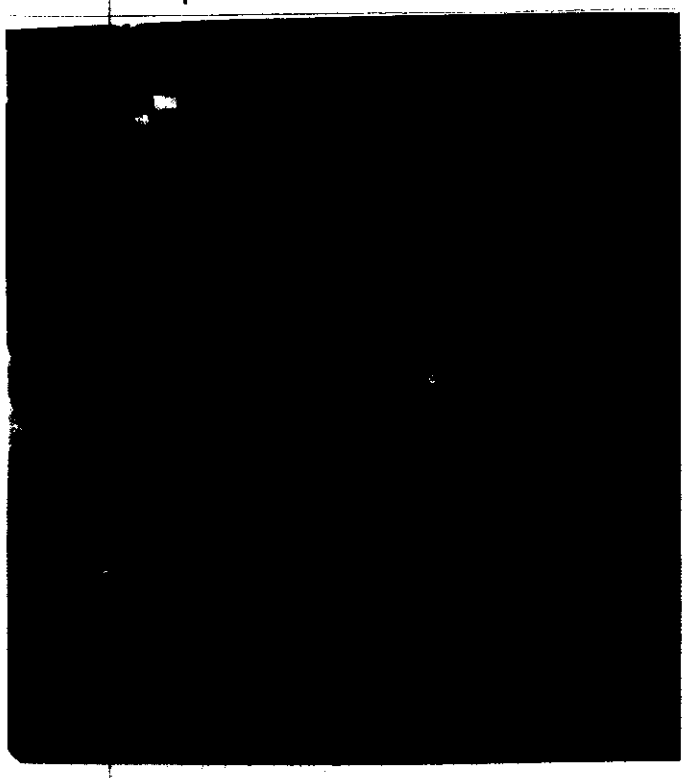


Fig .30 (B)
Erection cavernosogram showing severe venous leakage through the deep dorsal vein (short arrow),crural veins (long arrow) and superficial dorsal vein (arrow head) .

CASE 3

Clinical History :

48 years old man suffering from impotence (No erection at all) since 5 months.

Papaverine Test :

Partial tumescence E2

Doppler For PBI :

Suggestive of bilateral arterial insufficiency.
Right Cavernosal artery = 0.68
Left Cavernosal artery = 0.68

Duplex Sonography : (Fig. 31-A)

Bilateral arterial insufficiency with suspected venous leakage ..

Right PSV	= 23.3	cm/sec.
Right EDV	= 9.1	cm/sec.
Left PSV	= 19.3	cm/sec.
Left EDV	= 8.1	cm/ sec.

Cavernosometry :

Moderate venous leakage through the following parameters :
Initial ICP = 35 mm.Hg.
IFR = 80 ml/min.
MFR = 28 ml/ min.
Drop in pressure 5 minutes postinfusion stoppage = from 100 to 30 mmHg.

Cavernosography : (Fig. 31-B)

Venous leakage via deep system (Crural v.) with opacification of right internal pudendal and right internal iliac veins.
Opacified right external pudendal vein.

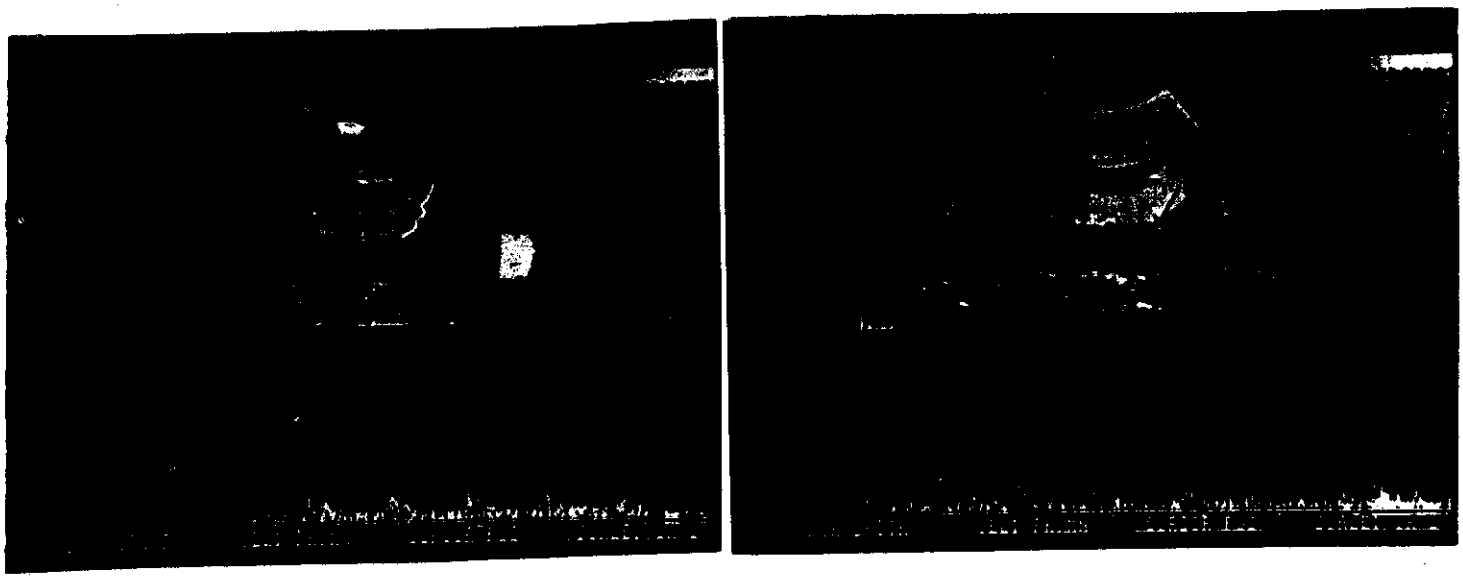


Fig .31 (A)

Duplex sonography demonstrating peak systolic and end diastolic velocities in both cavernosal arteries.

Fig . 31 (B)

Erection cavernosogram demonstrating moderate venous leakage with opacification of the crural veins (short arrow) , right internal pudendal vein (long arrow) and right internal iliac vein .

CASE 4

Clinical History :

38 years old man suffering from impotence (Moderate erection able to just penetration followed by rapid decay) since 2 years.

Papaverine Test :

Full tumescence E3

Doppler For PBI :

Suggestive of normal arterial supply
Right Cavernosal artery =1
Left Cavernosal artery =0.92

Duplex Sonography : (Fig. 32-A)

Normal arterial supply with suspected venous leakage.
Right PSV = 58 cm/sec.
Right EDV = 19 cm/sec.
Left PSV = 34 cm/sec.
Left EDV = 10 cm /sec.

Cavernosometry :

Severe venous leakage through the following parameters :
Initial ICP = 38 mmHg.
IFR = 150 ml/min.
MFR = 40 ml/min.
Drop in pressure 5 minutes postinfusion stoppage = from 100 to 25 mmHg.

Cavernosography : (Fig. 32-B)

Venous leakage via deep system (Crual v.) with opacification of internal pudendal and right internal iliac veins.
Opacification of superficial dorsal, bilateral external pudendal veins and glans penis are noticed.

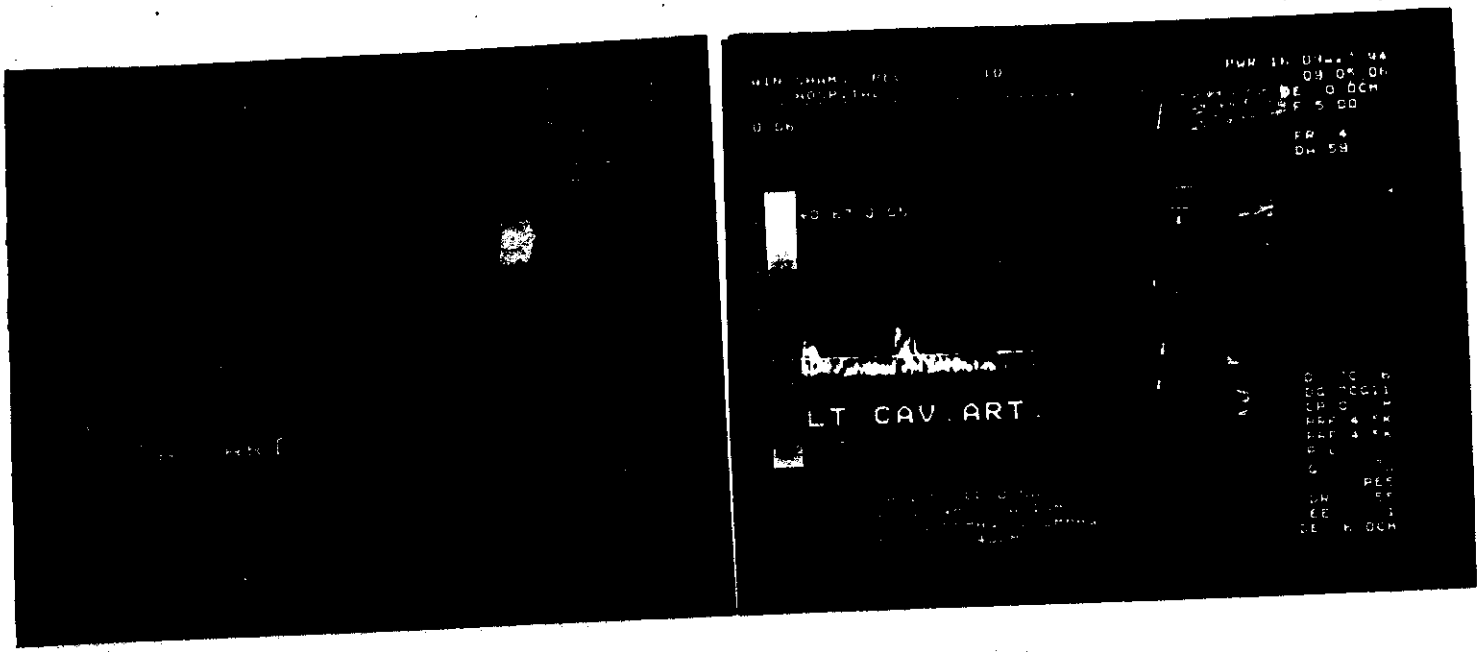


Fig 32 (A)
Duplex sonography showing peak systolic and end diastolic velocities in both cavernosal arteries .

Fig 32 (B)
Abnormal cavernosogram showing severe venous leakage via the crural veins (arrow).with opacification of the right vesical vein (arrow head) .

CASE 5

Clinical History :

39 years old man suffering from impotence (Mild erection unable for penetration) since 2 years.

Papaverine Test :

Partial tumescence E2

Doppler For PBI :

Suggestive of normal arterial supply
Right Cavernosal artery = 0.79
Left Cavernosal artery = 0.93

Duplex Sonography : (Fig. 33-A)

Normal arterial supply with suspected venous leakage.

Right PSV	= 27	cm/sec.
Right EDV	= 8	cm/sec.
Left PSV	= 69	cm/sec.
Left EDV	= 13	cm /sec.

Cavernosometry :

Moderate venous leakage through the following parameters :
Initial ICP = 40 mmHg.
IFR = 120 ml/min.
MFR = 25 ml/min.
Drop in pressure 5 min postinfusion stoppage = from 100 to 30 mmHg.

Cavernosography : (Fig. 33-B)

Venous leakage via intermediate system (deep dorsal vein) with opacification of prostatic plexus, right internal pudendal plexus and right internal iliac vein. Opacified corpus spongiosum and glans penis.

Fig 33 (A)

Duplex sonography of both right and left cavernosal arteries demonstrating peak systolic and end diastolic velocities .

Fig . 33 (B)

Erection cavernosogram showing opacification of deep dorsal vein (short arrow), right vesical plexus (long arrow) and periprostatic plexus (arrowhead). Opacified corpus spongiosum and glans penis .

CASE 6

Clinical History :

52 years old man suffering from impotence (Mild erection unable for penetration) since 11 monthes.

Papaverine Test :

Elongation E1

Doppler For PBl :

Suggestive of normal arterial supply
Right Cavernosal artery = 0.82
Left Cavernosal artery = 0.82

Duplex Sonography : (Fig. 34-A)

Normal arterial supply with suspected venous leakage.

Right PSV	= 46.6	cm/sec.
Right EDV	= 19.3	cm/sec.
Left PSV	= 41.6	cm/sec.
Left EDV	= 19	cm /sec.

Cavernosometry :

Severe venous leakage was suspected as failure of induction of erection by rate of 260 ml/minute.
The initial intracorporal pressure was 23 mmHg.

Cavernosography : (Fig. 34-B)

Venous leakage via intermediate system with opacification of the deep dorsal v., circumflex veins, prostatic plexus, pudendal plexus, internal pudendal and vesical veins. Opacified superficial dorsal vein.

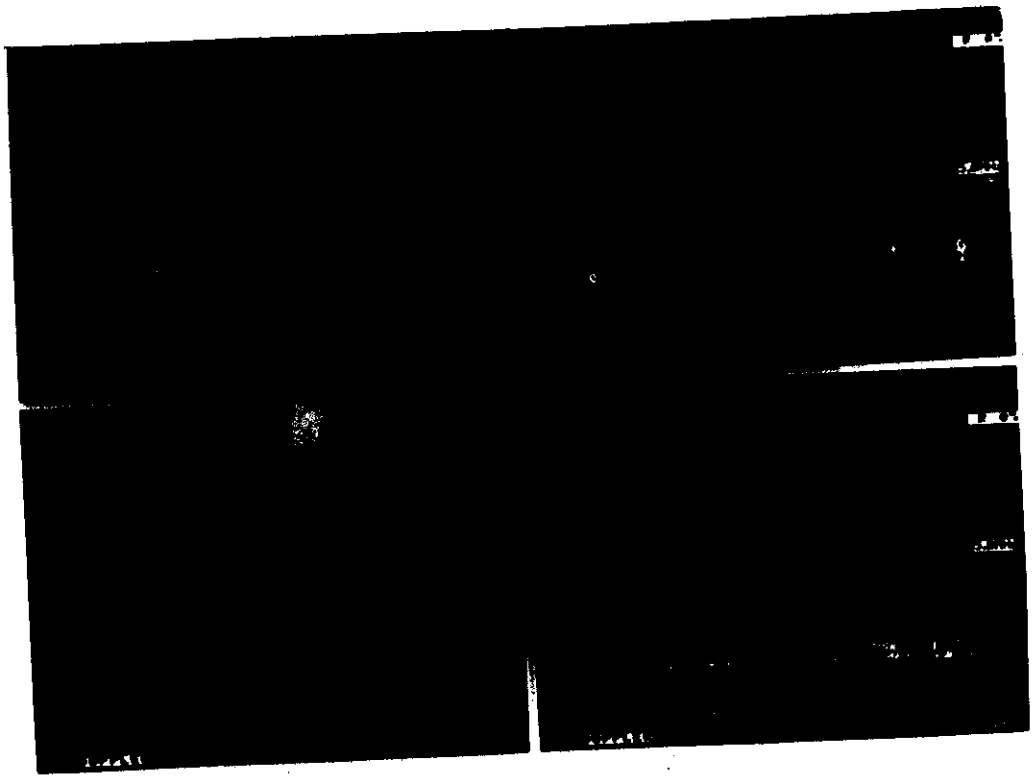


Fig . 34 (A)
Color duplex sonography showing peak systolic and end diastolic velocities in both left and right cavernosal arteries .

Fig . 34 (B)
Abnormal cavernosogram showing severe venous leakage through the deep dorsal veih (long arrow) and circumflex veins (short arrow) draining into the prostatic venous plexus that drains into the -vesical vein (arrow head) and internal pudendal vein (curved arrow) .

CASE 7

Clinical History :

41 years old man suffering from impotence (No erection at all) since 1 year.

Papaverine Test :

Elongation E1

Doppler For PBI :

Suggestive of bilateral arterial insufficiency.
Right Cavernosal artery =0.58
Left Cavernosal artery = 0.51

Duplex Sonography : (Fig. 35-A)

Normal arterial supply with suspected venous leakage.

Right PSV	= 19.6	cm/sec.
Right EDV	=1.1	cm/sec.
Left PSV	= 12.4	cm/sec.
Left EDV	= 1	cm /sec.

Cavernosometry :

Normal veno- occlusive mechanism.

Arteriography : (Fig. 35-B&C)

Bilateral selective iliac arteriography showing occlusion at the common penile artery in both sides with non opacification of both dorsal or cavernosal arteries.

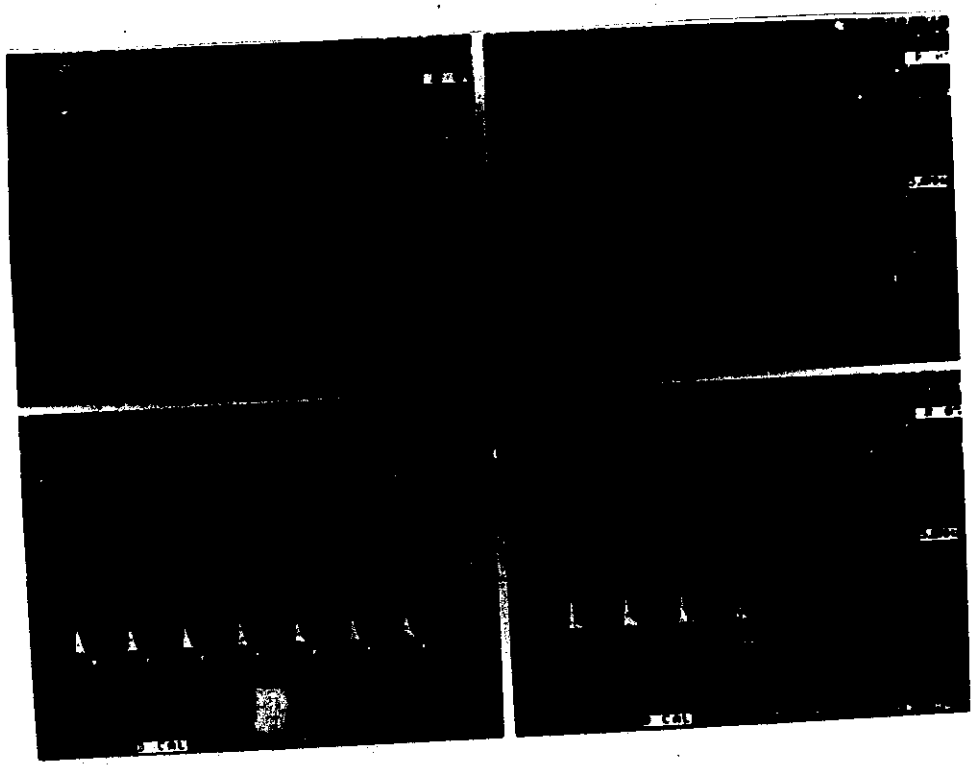


Fig . 35 (A)
Color duplex sonography demonstrate right and left arterial insuficiency with intact veno-occlusive mechanism .

Fig . 35 (B & C)
Selective internal iliac arteriography showing occlusion at both common penile arteries (arrows) .

CASE 8

Clinical History :

35 years old man suffering from impotence (Mild erection unable for penetration) since7 years.

Papaverine Test :

Partial tumescence E2

Doppler For PBI :

Suggestive of normal arterial supply
Right Cavernosal artery = 0.91
Left Cavernosal artery = 0.86

Duplex Sonography : (Fig. 36-A)

Normal arterial supply with suspected venous leakage.

Right PSV	= 26.5	cm/sec.
Right EDV	= 8	cm/sec.
Left PSV	= 25	cm/sec.
Left EDV	= 6.9	cm /sec.

Cavernosometry :

Severe venous leakage through the following parameters :
Initial ICP = 35 mmHg.
IFR =120 ml/min.
MFR = 45 ml/min.
Drop in pressure 5 minutes postinfusion stoppage = from 100 to 25 mmHg.

Cavernosography : (Fig. 36-B)

Venous leakage via deep venous system with opacification of the crural veins, right vesical and right internal iliac veins.
Opacified superficial dorsal vein.

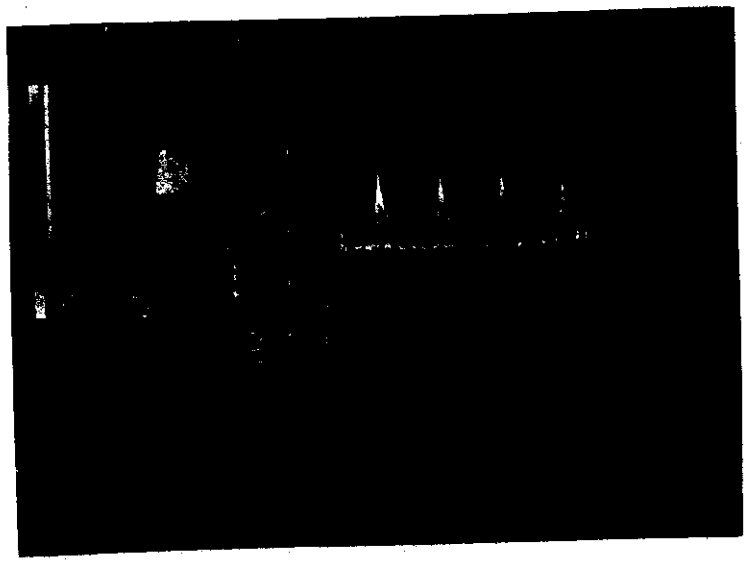


Fig . 36 (A)
Duplex sonography demonstrate normal PSV with high EDV .

Fig . 36 (B)
Severe venous leakage through the deep system with opacification of the right vesical vein (short arrow) and right internal iliac vein . Opacified superficial dorsal vein (long arrow) .

CASE 9

Clinical History :

25 years old man suffering from impotence (Mild erection unable for penetration) since 1 year.

Papaverine Test :

Partial tumescence E2

Doppler For PBI :

Suggestive of normal arterial supply..
Right Cavernosal artery =1.1
Left Cavernosal artery = 1.3

Duplex Sonography : (Fig. 37-A)

Normal arterial supply with suspected venous leakage.

Right PSV	= 31	cm/sec.
Right EDV	= 8	cm/sec.
Left PSV	= 33	cm/sec.
Left EDV	= 6	cm /sec.

Cavernosometry :

Mild venous leakage through the following parameters :
Initial ICP = 40 mmHg.
IFR =60 ml/min
MFR = 16 ml/min.
Drop in pressure 5 minutes postinfusion stoppage = from 100 to 40 mmHg.

Cavernosography : (Fig. 37-B)

Venous leakage via crural veins with opacification of internal pudendal veins on both sides.

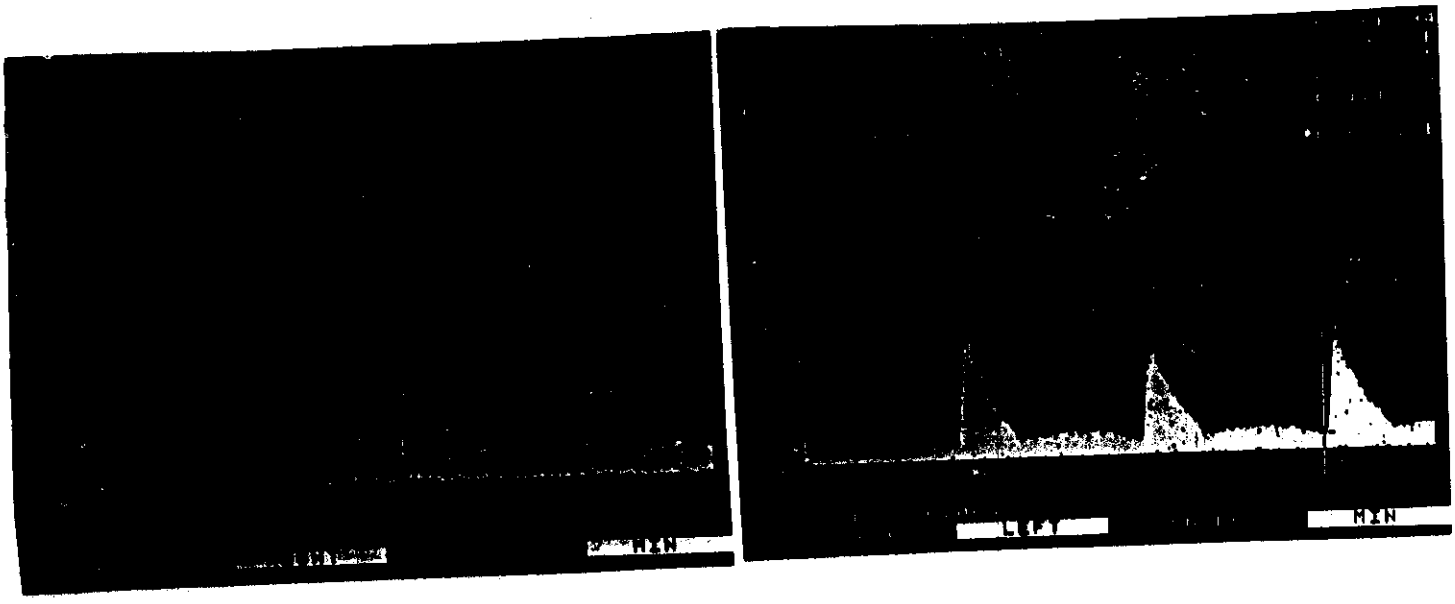


Fig 37 (A)
Duplex sonography of both Cavernosal arteries.

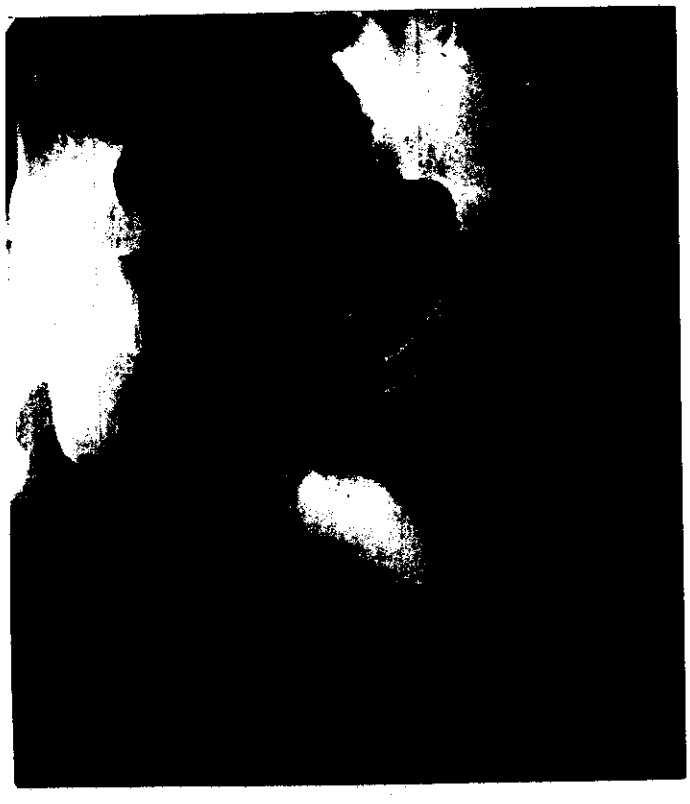


Fig . 37 (B)
Abnormal cavernosogram showing mild venous leakage through crural veins (arrow) .

CASE 10

Clinical History :

41 years old man suffering from impotence (Moderate erection able to just penetration followed by rapid decay) since 2 years.

Papaverine Test :

Partial tumescence E2

Doppler For PBI :

Suggestive of normal arterial supply.
Right Cavernosal artery =0.92
Left Cavernosal artery = 1.00

Duplex Sonography : (Fig. 38-A)

Normal arterial supply with suspected venous leakage.

Right PSV	= 27.3	cm/sec.
Right EDV	= 7.4	cm/sec.
Left PSV	= 29	cm/sec.
Left EDV	= 9.2	cm /sec.

Cavernosometry :

Severe venous leakage through the following parameters :
Initial ICP = 35 mmHg.
IFR =130 ml/min.
MFR = 35 ml/min.
Drop in pressure 5 minutes postinfusion stoppage = from 100 to 25 mmHg.

Cavernosography : (Fig. 38-B)

Venous leakage through deep system with opacification of crural veins, prostatic venous plexus, right vesical vein and right internal pudendal veins.
Opacified superficial dorsal vein and glans penis.

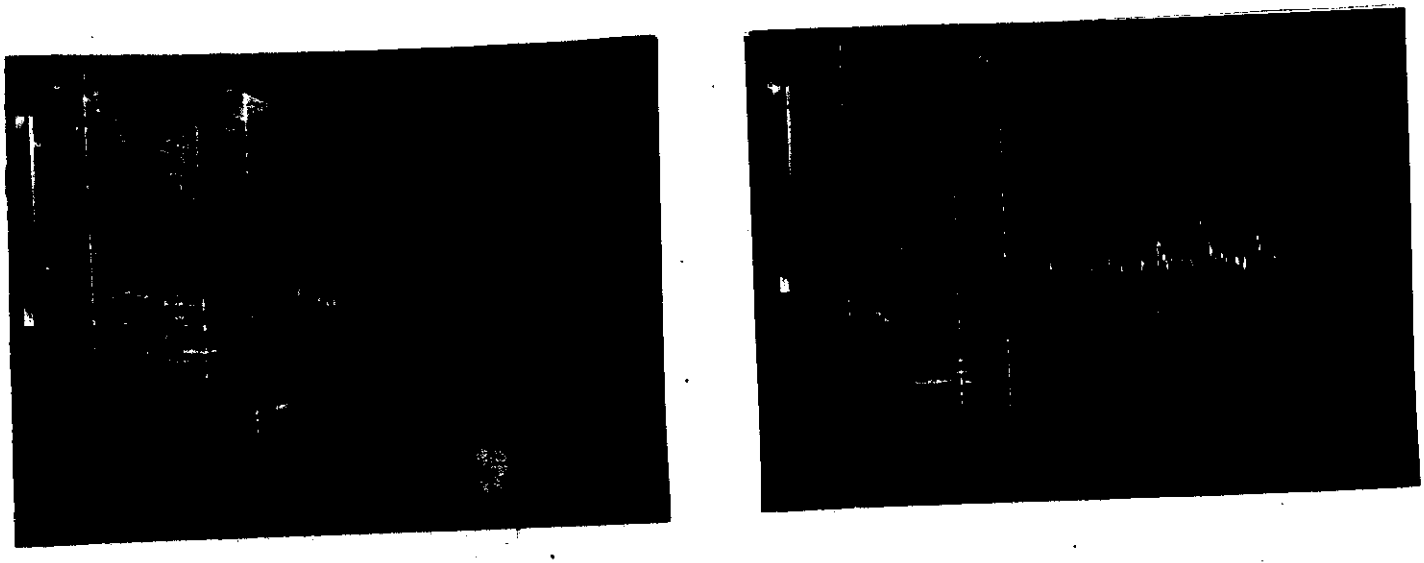


Fig .38 (A)
Duplex sonography of both cavernosal arteries .

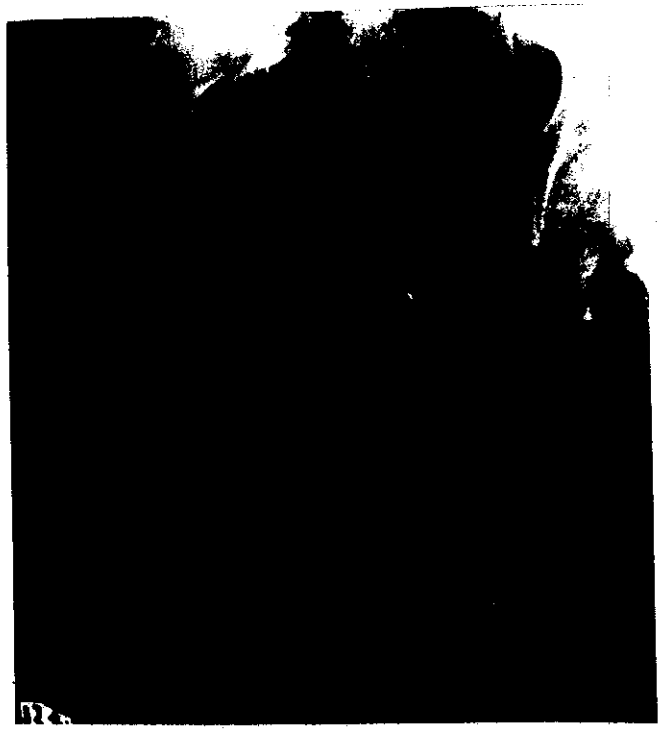


Fig . 38 (B)
Cavernosogram showing severe venous leakage through crural veins draining into prostatic venous plexus that drains into vesical vein (short arrow). Opacified glans penis (long arrow) was noticed .

CASE 11

Clinical History :

50 years old man suffering from impotence (Mild erection unable for penetrati n) since 2 years.

Papaverine Test :

Full tumescence E3

Doppler For PBI :

Suggestive of normal arterial supply.
Right Cavernosal artery =0.82
Left Cavernosal artery = 0.88

Duplex Sonography : (Fig. 39-A)

Normal arterial supply with suspected venous leakage.

Right PSV	= 25	cm/sec.
Right EDV	= 10	cm/sec.
Left PSV	= 32.3	cm/sec.
Left EDV	= 12	cm /sec.

Cavernosometry :

Severe venous leakage through the following parameters :
Initial ICP = 30 mmHg.
IFR =150 ml/min.
MFR = 30 ml/min.
Drop in pressure 5 min postinfusion stoppage = from 100 to 25 mmHg.

Cavernosography : (Fig. 39-B)

Venous leakage throu n deep system (crural veins).
Opacificed prostatic venous plexus, right internal pudendal and right vesical veins.
Opacified bilateral external pudendal veins and right saphenous vein.

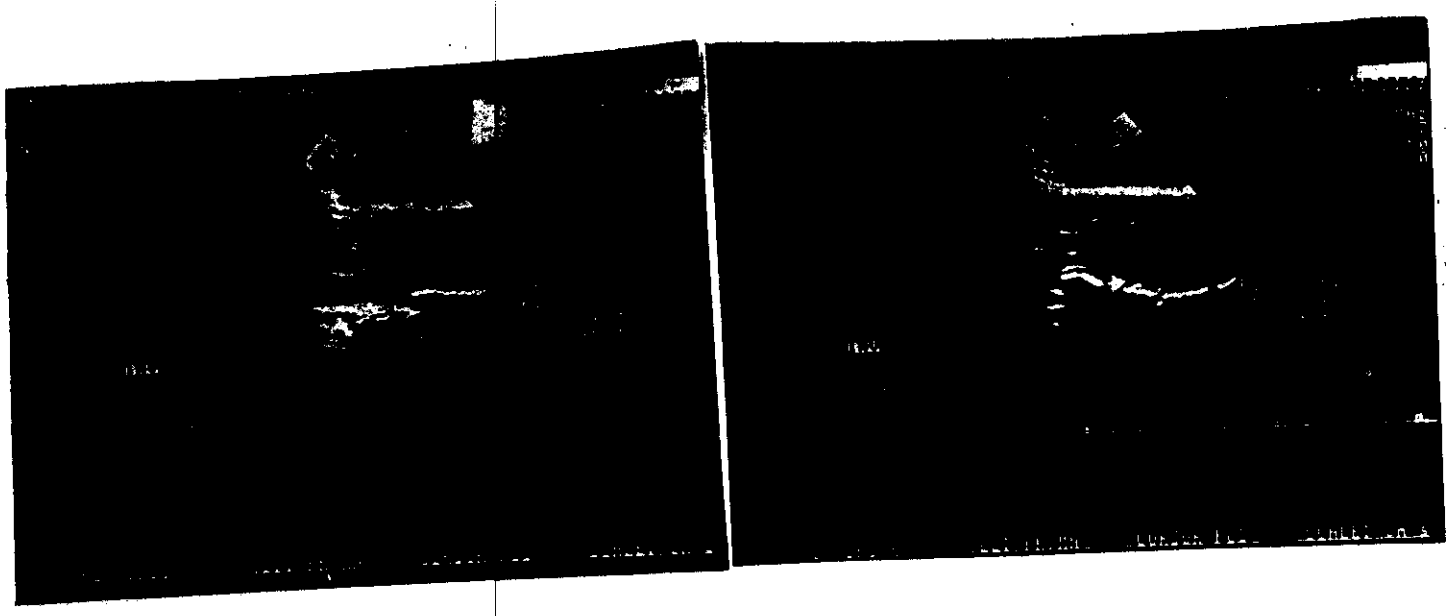


Fig . 39 (A)
Duplex sonography of both cavernosal arteries .

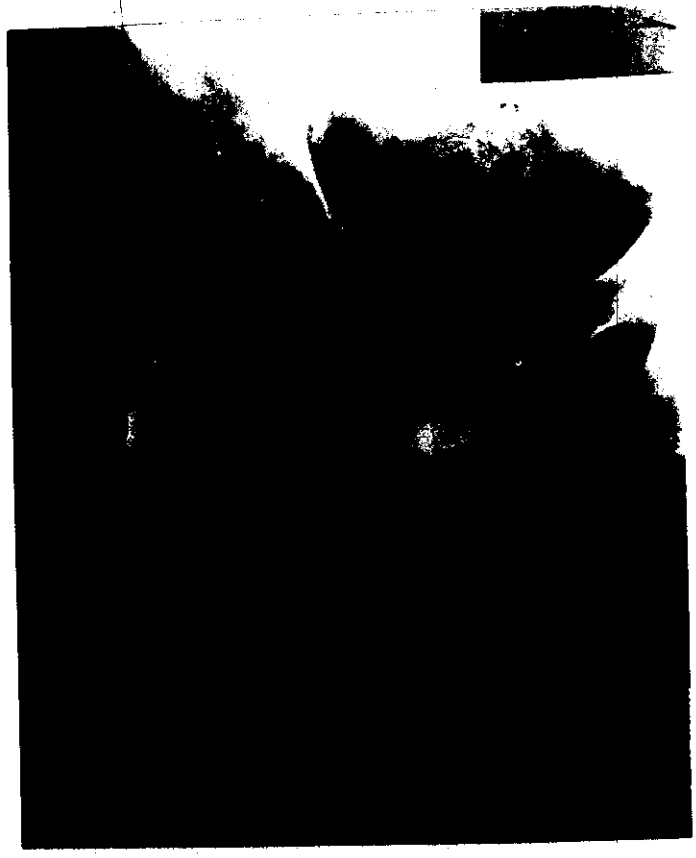


Fig . 39 (B)
Severe venous leakage through crural veins with opacification of prostatic plexus (short arrow) right vesical vein (long arrow), right external pudendal (arrowhead) and right saphenous vein (curved arrow)

CASE 12

Clinical History :

39 years old man suffering from impotence (Mild erection unable for penetration) since 2 years.

Papaverine Test :

Partial tumescence E2

Doppler For PBI :

Suggestive of normal arterial supply.
Right Cavernosal artery =0.82
Left Cavernosal artery = 0.88

Duplex Sonography : (Fig. 40-A)

Normal arterial supply with suspected venous leakage.

Right PSV	= 35.5	cm/sec.
Right EDV	= 12.5	cm/sec.
Left PSV	= 37.4	cm/sec.
Left EDV	= 10.3	cm /sec.

Cavernosometry :

Moderate venous leakage through the following parameters :
Initial ICP = 35mmHg.
IFR =100 ml/min.
MFR = 26 ml/min.
Drop in pressure 5 min postinfusion stoppage = from 100 to 30 mmHg.

Cavernosography : (Fig. 40-B)

Venous leakage through deep dorsal vein (intermediate system) and crural veins (deep system) with opacification of the left vesical plexus and internal pudendal vein.

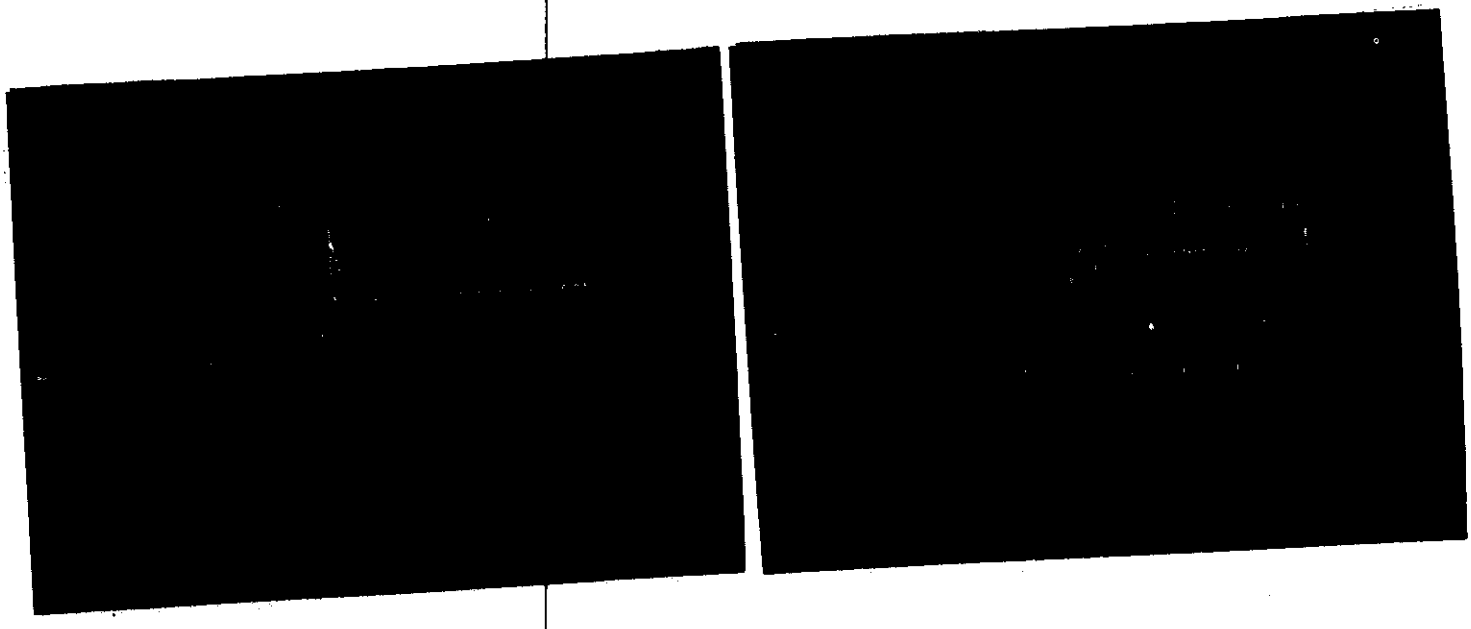


Fig . 40 (A)
Duplex sonography of both left and right cavernosal arteries

Fig . 40 (B)
Moderate venous leakage through duplicated deep dorsal vein(short arrow) and crural veins (long arrow). Opacified superficial ventral penile vein is noticed (arrow head) .

CASE 13

Clinical History :

29 years old man suffering from impotence (Mild erection unable for penetration) since 6 months.

Papaverine Test :

Full tumescence E3

Doppler For PBI :

Suggestive of normal arterial supply
Right Cavernosal artery =0.92
Left Cavernosal artery = 0.92

Duplex Sonography : (Fig. 41-A)

Normal arterial supply with suspected venous leakage.
Right PSV =31 cm/sec.
Right EDV = 12 cm/sec.
Left PSV = 35 cm/sec.
Left EDV = 16 cm/ sec.

Cavernosometry :

Moderate venous leakage through the following parameters :
Initial ICP = 40 mmHg.
IFR =80 ml/min.
MFR = 23 ml/min.
Drop in pressure 5 min postinfusion stoppage = from 100 to 35 mmHg.

Cavernosography : (Fig. 41-B)

Venous leakage through deep dorsal vein with opacification of the prostatic vein and right internal pudendal vein.

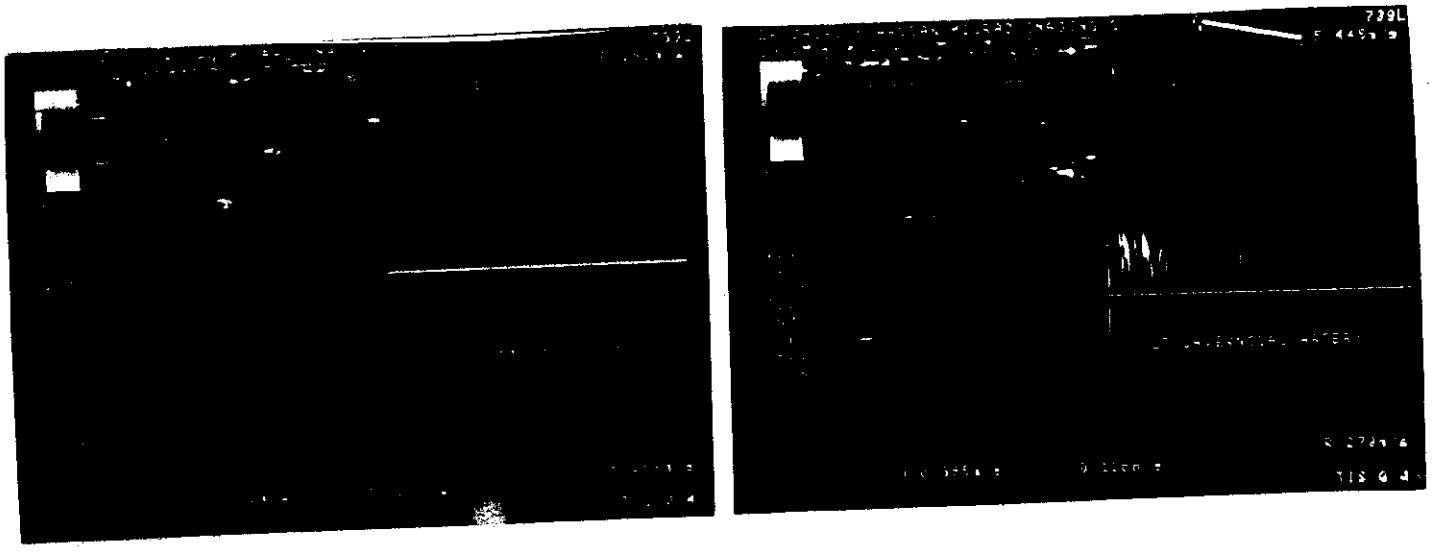


Fig . 41 (A)
Color duplex sonography of both cavernosal arteries .

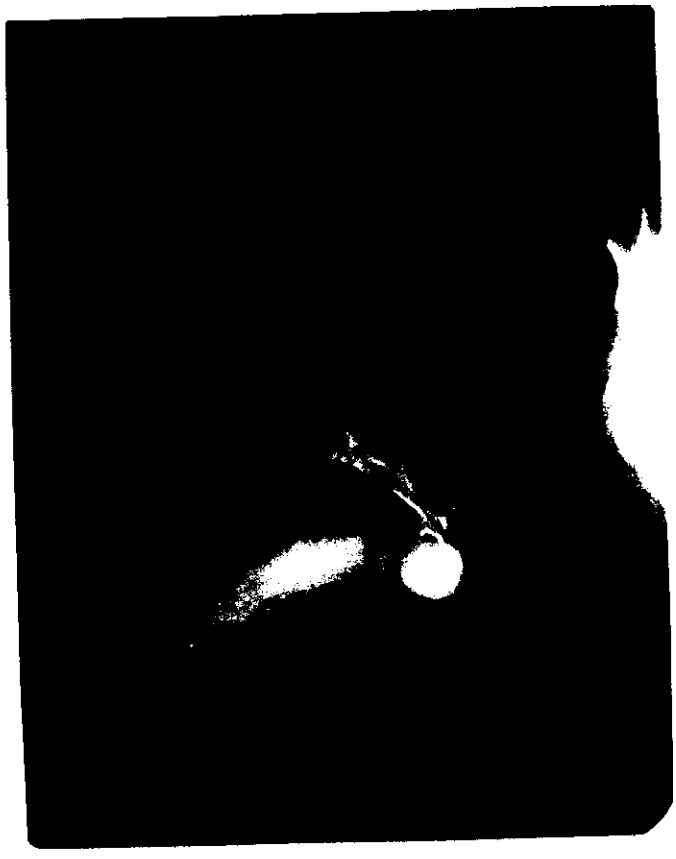


Fig . 41 (B)
Moderate venous leakage through deep dorsal vein (arrow)

CASE 14

Clinical History :

45 years old man suffer g from impotence (No erection)) since 5years.
Diabetic 5 years ago.

Papaverine Test :

Partial tumescence E2

Doppler For PBI :

Suggestive of normal arterial supply
Right Cavernosal artery = 0.90
Left Cavernosal artery = 0.90

Duplex Sonography : (Fig. 42-A)

Normal arterial supply with suspected venous leakage.

Right PSV	= 34	cm/sec.
Right EDV	= 7	cm/sec.
Left PSV	= 33	cm/sec.
Left EDV	= 12	cm/ sec.

Cavernosometry :

Failure of induction of erection by a rate of 245 ml/min which is indicative of severe venous leakage.

Cavernosography : (Fig. 42-B)

Venous leakage through the intermediate system with opacification of deep dorsal vein, prostatic venous plexus, right and left internal pudendal veins, right and left vesical veins and bilateral internal iliac veins.
Opacified left external pudendal vein.

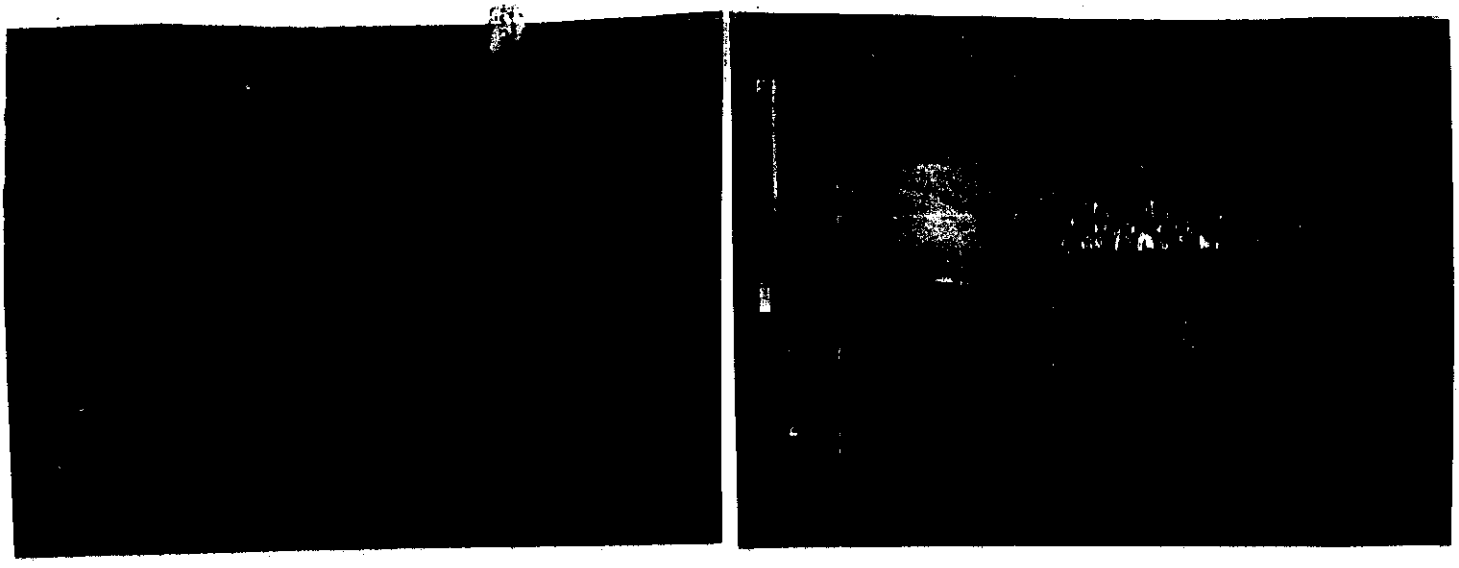


Fig . 42 (A)

Duplex sonography of both cavernosal arteries .

Fig . 42 (B)

Severe venous leakage through deep dorsal vein (short arrow) draining into prostatic plexus (arrow head) that drains in both vesical veins (long arrow) and internal pudendal vein (curved arrow) .

CASE 15

Clinical History :

39 years old man suffering from impotence (Moderate erection able to just penetration followed by rapid decay) since 1 year.

Papaverine Test :

Partial tumescence E2

Doppler For PBI :

Suggestive of normal arterial supply
Right Cavernosal artery = 0.92
Left Cavernosal artery =0.82

Duplex Sonography : (Fig. 43-A)

Normal arterial supply with suspected venous leakage.
Right PSV = 26 cm/sec.
Right EDV = 4.8 cm/sec.
Left PSV =32.4 cm/sec.
Left EDV = 6.6 cm /sec.

Cavernosometry :

Severe venous leakage through the following parameters :
Initial ICP = 40 mmHg.
IFR =110 ml/min.
MFR = 30 ml/min.
Drop in pressure 5 min postinfusion stoppage = from 100 to 30 mmHg.

Cavernosography : (Fig. 43-B)

Venous leakage through the crural veins(deep system) with filling of prostatic venous plexus, right vesical vein and partial filling of right internal pudendal vein.

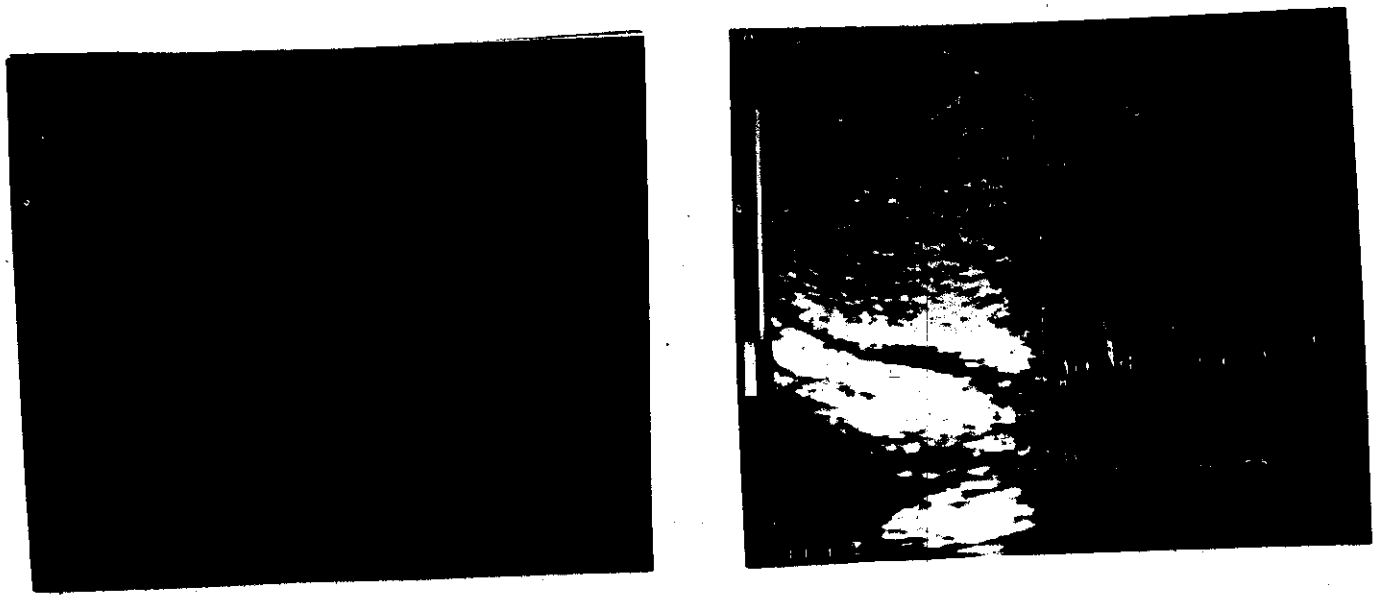


Fig . 43 (A)
Duplex sonography of both cavernosal arteries demonstrating flow velocities .

Fig . 43 (B & C)
Erection cavernosogram showing severe venous leakage through crural veins (short arrow) prostatic veins and right vesical vein (long arrow) .

CASE 16

Clinical History :

48 years old man suffering from impotence (No erection) since 2 years. Smoker patient.

Papaverine Test :

Elongation E1

Doppler For PBI :

Suggestive of normal arterial supply
Right Cavernosal artery =0.82
Left Cavernosal artery = 0.82

Duplex Sonography : (Fig. 44-A)

Normal arterial supply with suspected venous leakage.
Right PSV = 70 cm/sec.
Right EDV = 19 cm/sec.
Left PSV = 70 cm/sec.
Left EDV = 15 cm /sec.
Echogenic plaque 2x1 cm near the base of the right corpora likely fibrous plaque.

Cavernosometry :

Severe venous leakage through the following parameters :
Initial ICP = 35 mmHg.
IFR =140 ml/min.
MFR = 40 ml/min.
Drop in pressure 5 min postinfusion stoppage = from 100 to 30 mmHg.

Cavernosography : (Fig. 44-B)

Venous leakage through deep dorsal vein (intermediate system) with simultaenous filling of prostatic venous plexus, bilateral vesical veins and left internal pudendal vein.
Filling defect near the root of the corpora 2.3 X 1.2 cm.

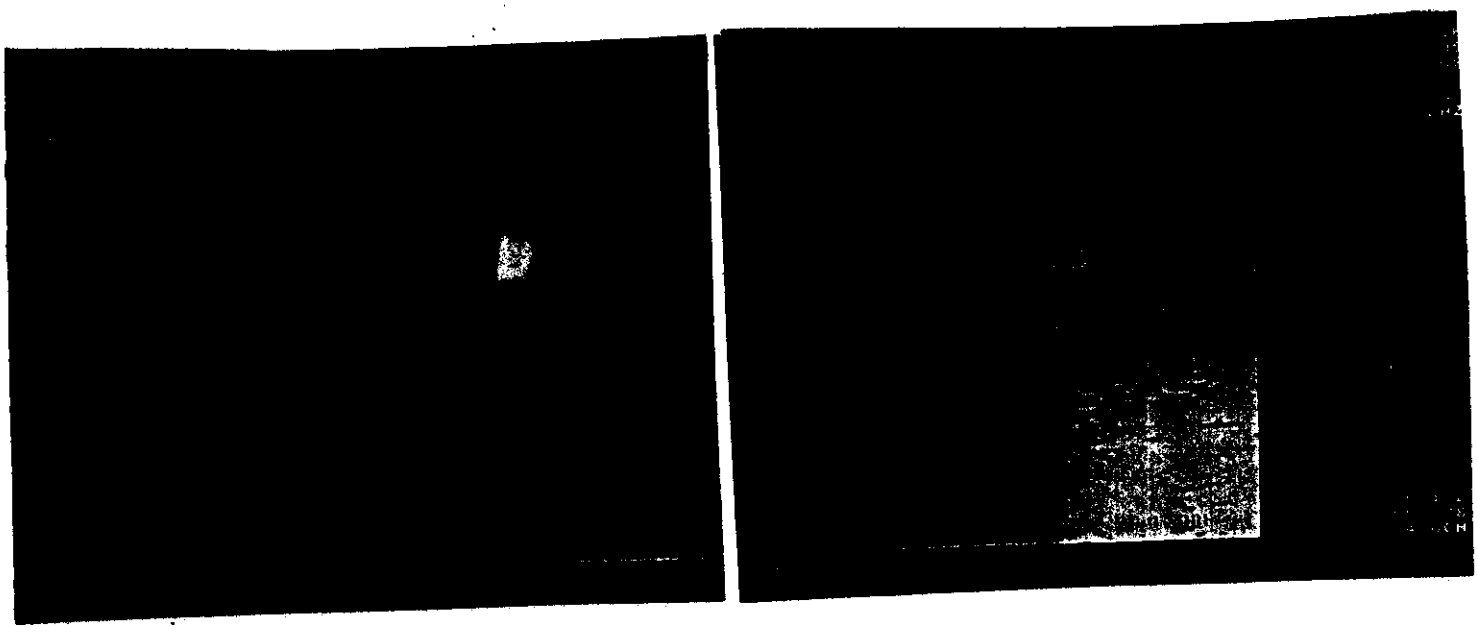


Fig 44 (A)

Duplex sonography of right cavernosal artery demonstrate flow velocities. Echogenic plaque was noticed in the right corpora

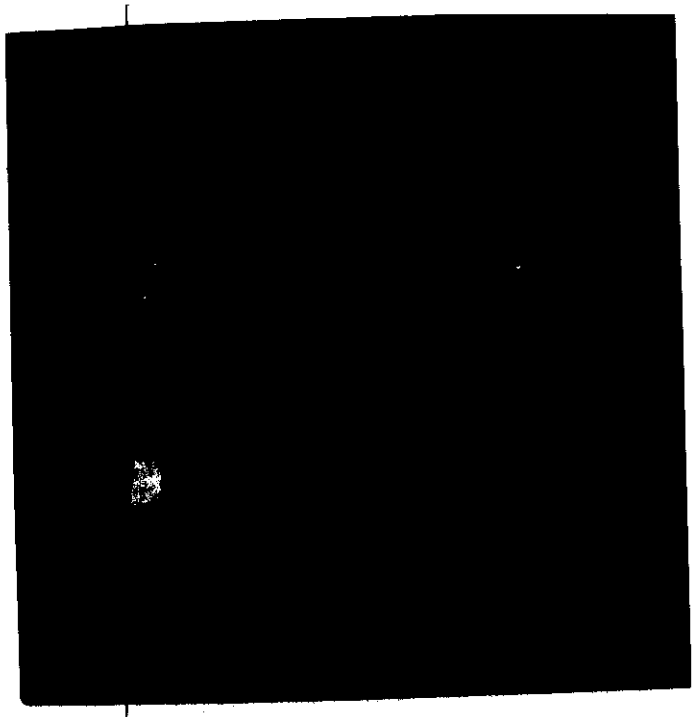


Fig . 44 (B)

Erection cavernosogram showing severe venous leakage through deep dorsal vein (short arrow), prostatic venous plexus (long arrow) and bilateral vesical veins. A small filling defect was seen (between arrowheads).

CASE 17

Clinical History :

41 years old man suffering from impotence (Moderate erection able to just penetration followed by rapid decay) since 6 months.

Papaverine Test :

Full tumescence E3

Doppler For PBI :

Suggestive of normal arterial supply.
Right Cavemosal artery = 1
Left Cavernosal artery = 1

Duplex Sonography : (Fig. 45-A)

Normal arterial supply with suspected venous leakage.

Right PSV	= 43.7	cm/sec.
Right EDV	= 12.3	cm/sec.
Left PSV	= 26.3	cm/sec.
Left EDV	= 4.6	cm /sec.

Cavernosometry :

Mild venous leakage though the following parameters :
Initial ICP = 50 mmHg.
IFR =70 ml/min.
MFR = 15 ml/min.
Drop in pressure 5 min postinfusion stoppage = from 100 to 40 mmHg.

Cavernosography : (Fig. 45-B)

Venous leakage through deep dorsal vein (intermediate system) draining into prostatic venous plexus then right vesical vein.
Opacified superficial dorsal vein.

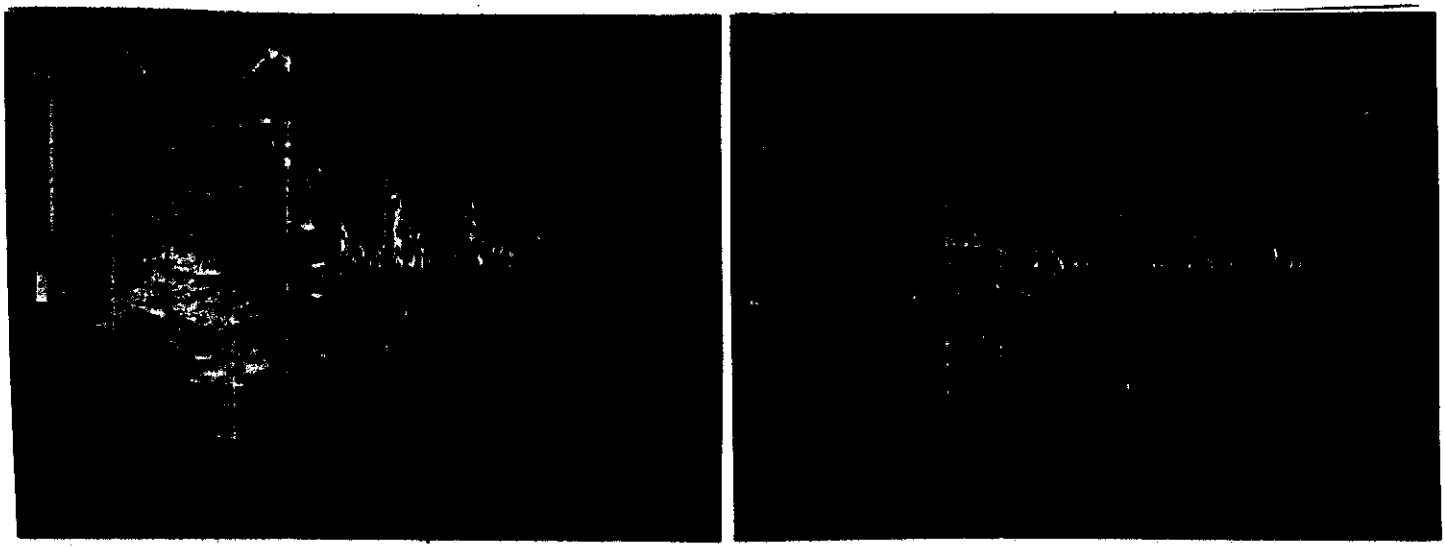


Fig . 45 (A)

Duplex sonography of both cavernosal arteries demonstrating flow velocities.

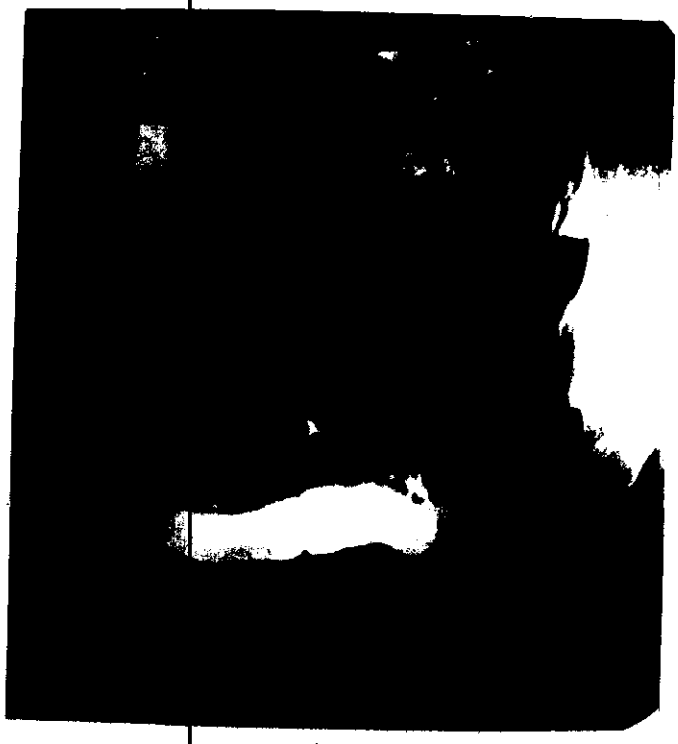


Fig . 45 (B)

Mild venous leakage through deep dorsal vein (short arrow) with filling of prostatic venous plexus (long arrow) . Opcification of corpus spongiosum (arrow head) and glans penis was noticed .

CASE 18

Clinical History :

55 years old man suffering from impotence (No erection) since 2 years. Smoker patient. Diabetic since 8 years.

Papaverine Test :

No erection E0

Doppler For PBI :

Suggestive of bilateral arterial insufficiency.
Right Cavernosal artery = 0.65
Left Cavernosal artery = 0.63

Duplex Sonography : (Fig. 46-A)

Bilateral arterial insuficiency with no evidence of venous leakage .

Right PSV = 19 cm/sec.
Right EDV = 4.2cm/sec.
Left PSV = 18 cm/sec.
Left EDV = 3 m/sec.

Cavernosometry :

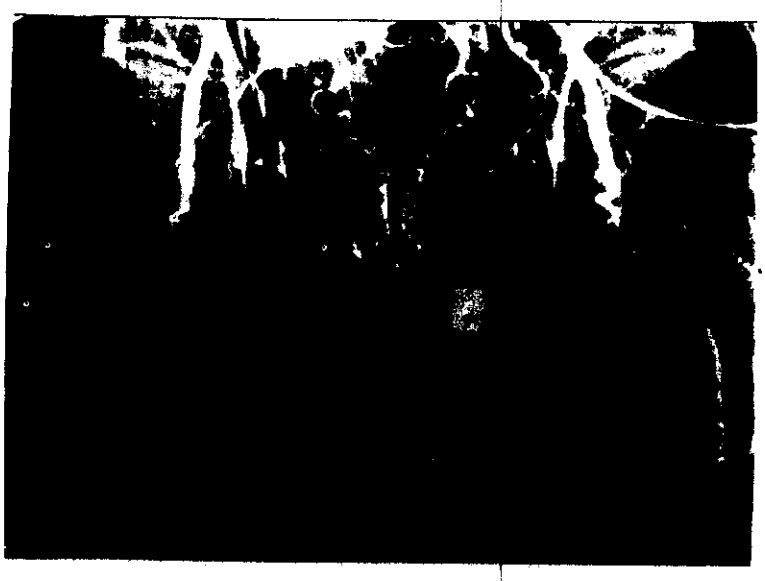
Intact veno- occlusive mechanism through the following parameters.

Initial ICP = 25 mmHg.
IFR =110 ml/min.
MFR = 7 ml/min.

Drop in pressure 5 min postinfusion stoppage = from 100 to 45 mmHg.

Arteriography : : (Fig. 46-B&C)

Non selective transfemoral aortography showing complete obstruction at the lower aorta and right common iliac with partial obstruction at left common iliac artery. Attenuated both internal iliac arteries. Non opacification of common penile arteries on both sides.



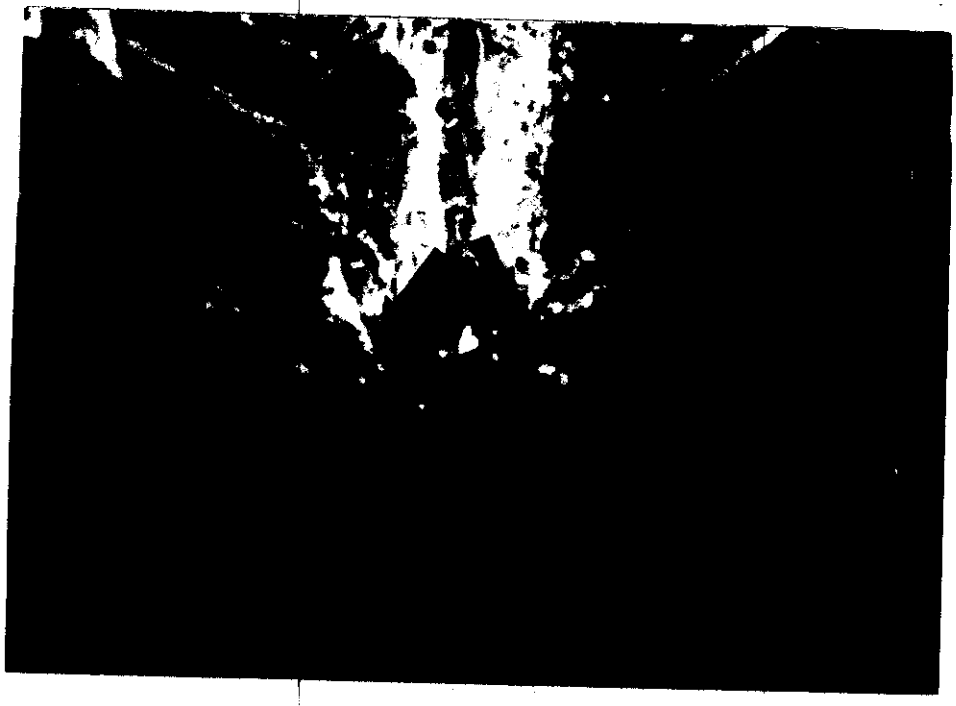


Fig . 46 (B&C)

Transfemoral aortography showing occlusion of lower aorta and both common iliac arteries.. Obstruction at the common penile arteries on both sides are noticed (arrowed) .

CASE 19

Clinical History :

55 years old man suffering from impotence (No erection) since 3 years . Heavy smoker patient. Diabetic since 10 years.

Papaverine Test :

No erection E0

Doppler For PBI :

Suggestive of bilateral arterial insufficiency.
Right Cavernosal artery = 0.64
Left Cavernosal artery = 0.60

Duplex Sonography : (Fig. 47-A)

Bilateral arterial insufficiency with no evidence of venous leakage.

Right PSV = 18 cm/sec.
Right EDV = 3 cm/sec.
Left PSV = 17 cm/sec.
Left EDV = 0 cm /sec.

Cavernosometry :

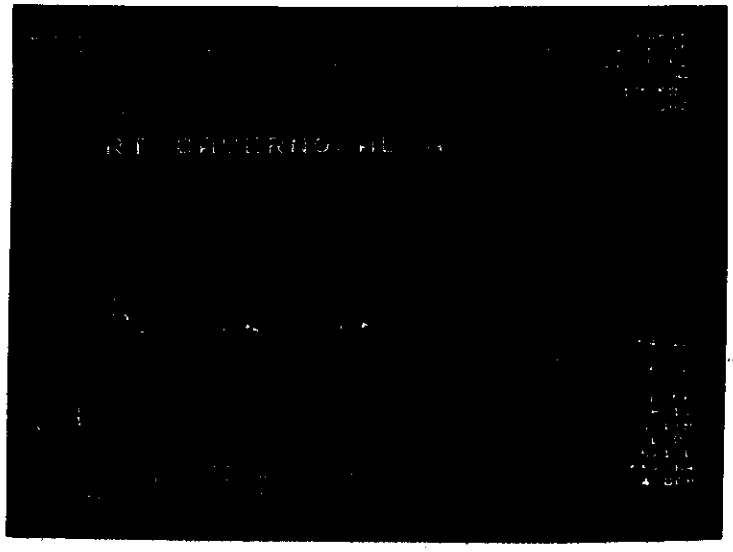
Intact veno-occlusive mechanism through the following parameters.

Initial ICP = 20 mmHg.
IFR =60 ml/min.
MFR = 5 ml/min.

Drop in pressure 5 min postinfusion stoppage = from 100 to 50 mmHg.

Arteriography : : (Fig. 47-B)

Transfemoral aortography demonstrate non filling of both common penile arteries and occlusion of the left superficial femoral artery.



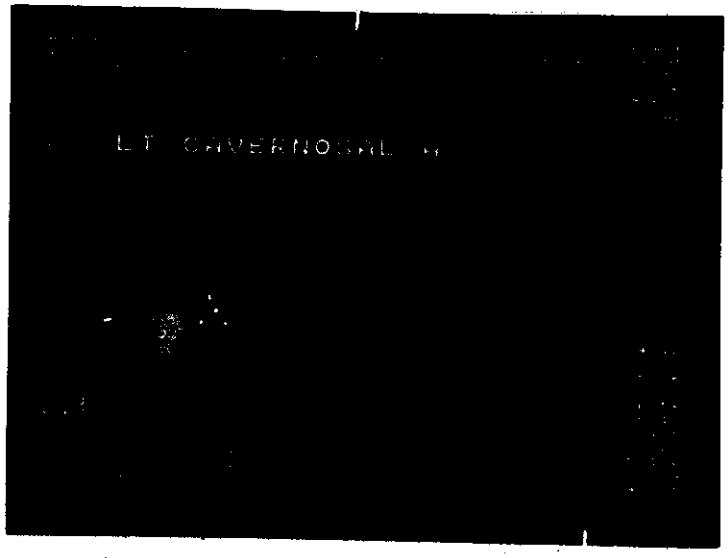


Fig . 47 (A)

Duplex sonography of both cavernosoal arteries showing low PSV .

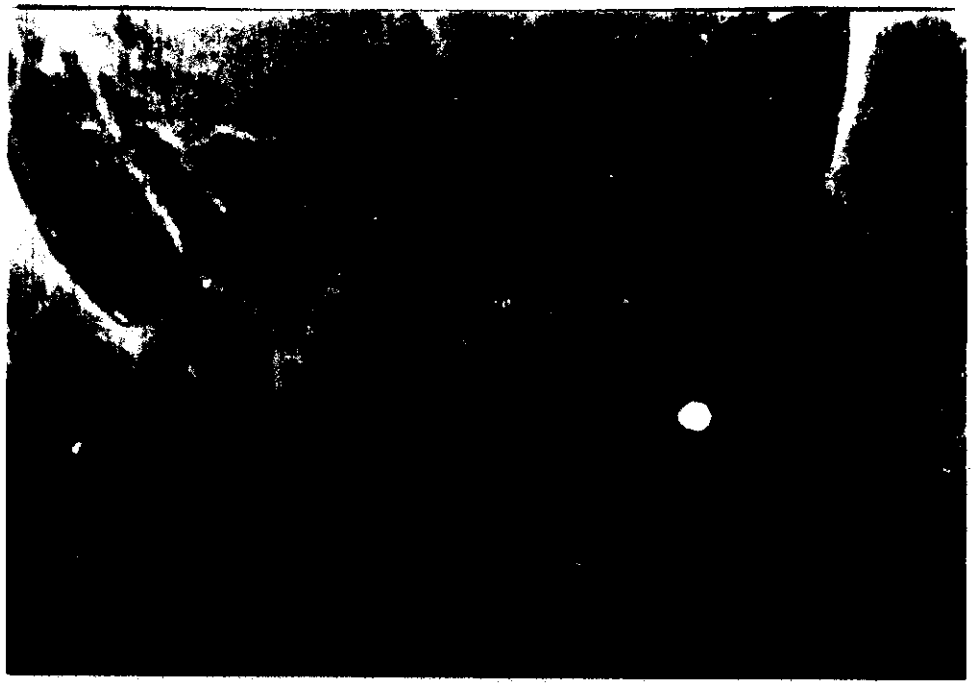


Fig . 47 (B)

Transfemoral aortography showing non filling of both common penile arteries at their origin (arrowed).Occlusion of left superficial femoral artery is noticed .

CASE 20

Clinical History :

41 years old man suffering from impotence (Mild erection unable for penetration) since 3 months.

Papaverine Test :

Full tumescence E3

Doppler For PBI :

Suggestive of normal arterial supply.
Right Cavernosal artery = 0.70
Left Cavernosal artery = 0.70

Duplex Sonography : (Fig. 48-A)

Normal arterial supply with suspected venous leakage.

Right PSV	= 25.9	cm/sec.
Right EDV	= 9.8	cm/sec.
Left PSV	= 25.9	cm/sec.
Left EDV	= 10.8	c/m sec.

Cavernosometry :

Intact veno- occlusive mechanism .
Initial ICP = 55 mmHg.
IFR =60 ml/min.
MFR = 6 ml/min.
Drop in pressure 5 min postinfusion stoppage = from 100 to 65 mmHg.

Cavernosography : (Fig. 48-B)

Good opacification of both corpora cavernosa with non filling of any venous channels at intracorporal pressure 150 mmHg.

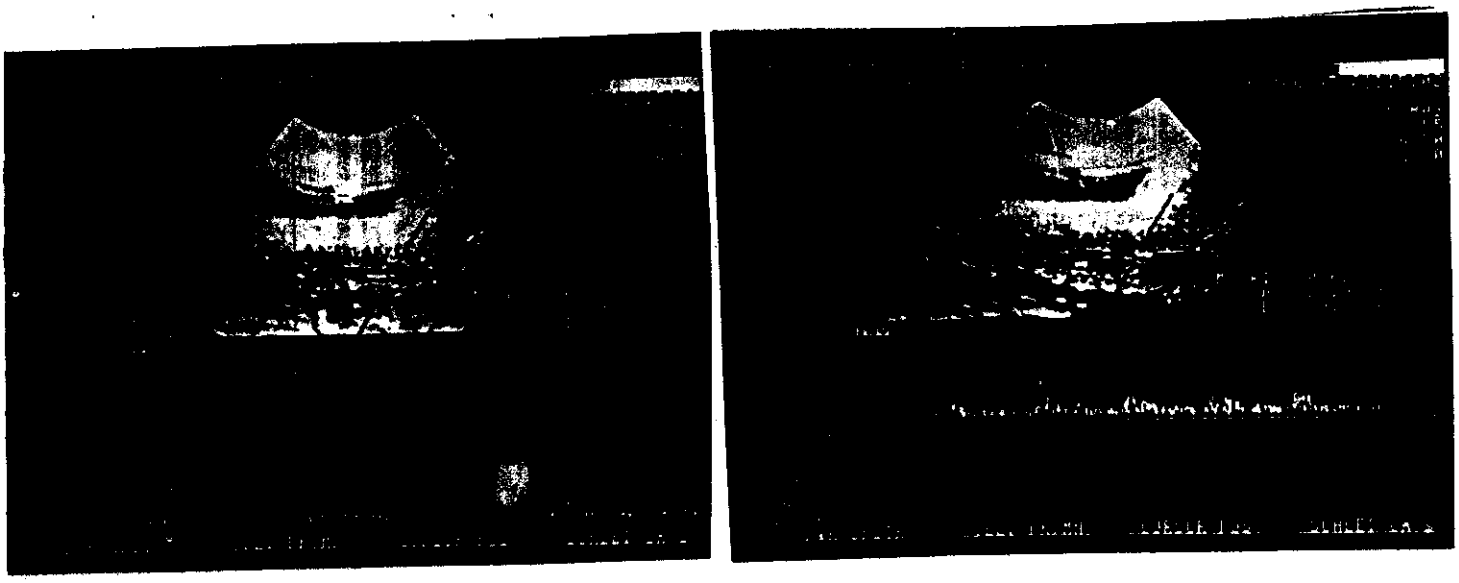


Fig . 48 (A)
Duplex sonography of both cavernosal arteries demonstrating high EDV.

Fig . 48 (B)
Erection cavernosogram shows non-filling of any venous channels

CASE 21

Clinical History :

35 years old man suffering from impotence (Full erection followed by rapid decay) since 1 years.

Papaverine Test :

Full tumescence E3

Doppler For PBI :

Suggestive of normal arterial supply.
Right Cavernosal artery = 0.91
Left Cavernosal artery =0.83

Duplex Sonography : (Fig. 49-A)

Normal arterial supply with suspected venous leakage.

Right PSV	= 43.7	cm/sec.
Right EDV	= 21.9	cm/sec.
Left PSV	= 49.5	cm/sec.
Left EDV	= 25.3	cm /sec.

Cavernosometry :

Moderate venous leakage through the following parameters :
Initial ICP = 25 mmHg.
IFR =100 ml/min.
MFR = 25 ml/min.
Drop in pressure 5 min postinfusion stoppage = from 100 to 30 mmHg.

Cavernosography : (Fig. 49-B)

Venous leakage through deep dorsal and crural veins with filling of right vesical and right internal pudendal veins.

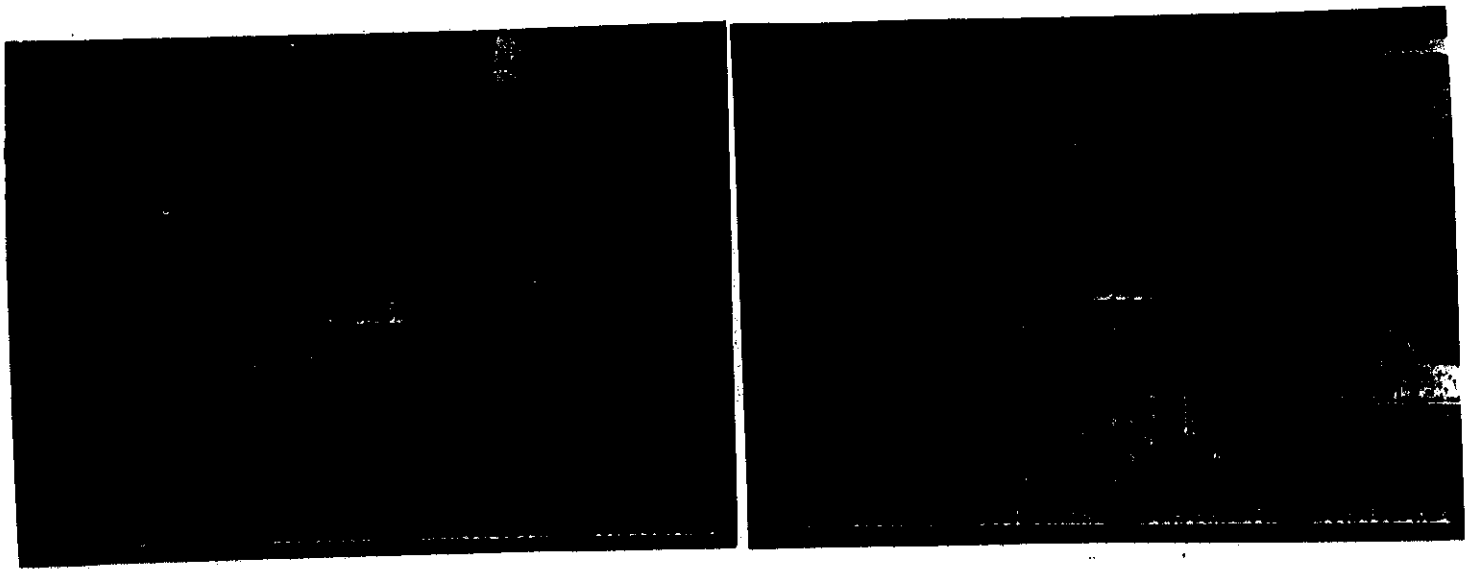


Fig . 49 (A)
Duplex sonography in both cavernosal arteries .

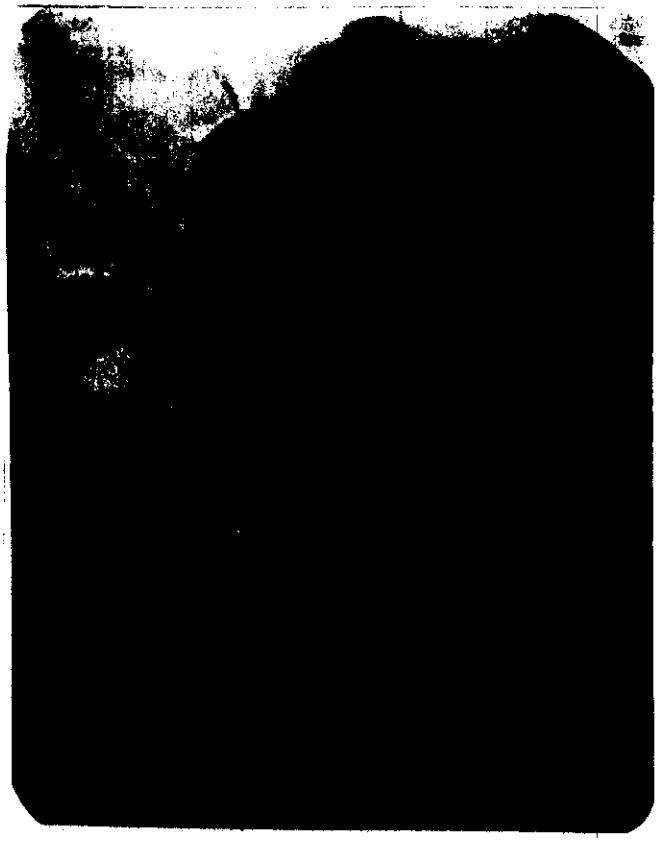


Fig . 49 (B)
Moderate venous leakage through crural veins (short arrow) with filling of right vesical vein (long arrow) and right internal pudendal vein (arrow head)