-RXUQDO RI /XQJ 'LVHDVHV 7UHDWPHQW
5DMSXW HW DO /XQJ 'LV 7UHDW
KWWS G[GRL RUJ
5HVHDUFK $UWLFOH 2SHQ $F

%JBHOPTUJD "QQSPBDI UP B $BTF PG 4FSPTJU

$WXO 6LQJK 5DMSXW 5DNHVK 6KDUPD -DMRR DQG *XQMDQ 'DOD
0DKDWPD *DQGKL ,QVWLWXWH RI 0HGLFDO 6FLHQFHV :DUGKD 0DKDUDVKWUD ,QGLD
&RUUHVSRQGLQJ DXWKRU $WXO 6LQJK 5DMSXW 0DKDWPD *DQGKL ,QVWLWXWH RI 0HGLFDO 6FLHQFHV 7HO
DWO UDMSXW #JPDLO FRP

5HFHLYHG GDWH $FFHSWHG GDWH 3XEOLVKHG GDWH

$EVWUDFW

(IIXVLRQV FDQ EH ODEHOHG DV LQIODPPDWRU\ H[XGDWLYH RU QRQ LQIODPPD
SDWKRSK\VLRORJLFDO SURFHVV LQYROYHG 9DULRXV ELRPDUNHUV IOXLG JOXFRV
SURWHLQ JUDGLHQW DOEXPLQ JUDGLHQW KDYH EHHQ SURSRVHG IRU WKH VDP
ELRPDUNHUV DJDLQVW WKH JROG VWDQGDUG F\WRORJ\ DQG WKH SUDFWLFDO X
GLDJQRVLQJ 7XEHUFXODU VHURVLWLV LQ D 7XEHUFXORVLV SUHYDOHQW DUHD ROL
SURYHV LWV YHUVDWLOLW\ LQ GLIIHUHQWLDWLQJ WKH SDWKRSK\VLRORJLFDO QD
PLQLPXP PXVW VWHS ODGGHU GLDJQRVWLF DOJRULWKP IRU D FDVH RI VHURVLWLV

.H\ZRUGV (VVXVLRQ ([XGDWLYH 7UDQVXGDWLYH ,QIODPPDWRU\ ELRPDUNHUV 6HURVLWLV 'LDJQRVWLF DOJRULWKP

,QWURGXFWLRQ

&ROOHFWLRQ RI VHURXV FDYLW\ IOXLG LV GHSHQGLQJ XSRQ WKH WRSRJUDSKLFDO VLWH RI FDVVLILHG LQWR SOHXUDO SHULFDUGLDO DQG SHULWRQHDO)XUWKHU LV EDVHG RQ WKH XQGHUO\LQJ SDWKRSK\VLRORJLFDO SURFHVV LQ LQIODPPDWRU\ RU QRQ LQIODPPDWRU\ FODVVLFDOO\ WKH OLJKWV FULWHULD KDG EHHQ SURSRVHG IRU WKLV SXUSRVH EXW RWKHU GLDJQRVWLF FULWHULD KDYH EHHQ SURSRVHG EXW IDOOV VKRUW LQ VRPH RU WKH RWKHU UHYLHZ DQG DQDO\VLV RI HDFK RI WKH DVFHUWDLQ ZKLFK RQH RI WKHP LV WKH PRVW DFFXUDWH EHHQ XVHG IRU GLDJQRVLQJ 7XEHUFXODU VHURVLWLV +RZHYHU LW KDV EHHQ LQ O\PSKRF\WLF HIIXVLRQV VXFK DV FHOOV FOHDU WKDW UDLVHG $'$ OHYHOV GRQ W DOZD\V EXW KRZ IDU GRHV WKLV KROG WUXH LQ D WXEHUFXODU RXUV LV WKH QHHG RI WKH KRXU $'$ DQG D WXEHUFXODU VHURVLWLV 2XU VWXG\ SURSRVHV D YHU\ ODGGHU GLDJQRVWLF DSSURDFK WR D FDVH RI VHURVLWLV

0HWKRGV

6WXG\ VHWWLQJ GHVLJQ DQG SRSXODWLRQ

H VWXG\ ZDV FRQGXFWHG DW D UXUDO ,QGLD ,W ZDV D SURVSHFWLYH VWXG\ SDWLHQWV DJHG \HDUV DQG DERYH ZDUG DQG IRXQG WR KDYH VHURXV FDYLW\ FRQVLVWHG RI SDWLHQWV DGPLWWHG 'HF WR 6HSW KDYH LQYROYHG SDWLHQWV GLDJQRVWLF WKRUDFRFHQWHVLV VXSSRUWHG E\ ; UD\ RU E\ GLUHFW WDSSLQJ $OO SDWLHQWV KDYH

DOO SDWLHQWV ZLWK VXVSHFWHG HIIXVLRQ XQGHUZHQW UDGLRORJLFDO JXLGDQFH SDWLHQWV LQ ZKRP D FKHVW WXEH ZDV LQVHUWHG IRU WKHUDSHXWLF SDWLHQWV LQ ZKRP H[DFW HWLRORJLFDO SDWLHQWV ZKR ZHUH ORVW WR IROORZ X

6WXG\ SURFHGXUH

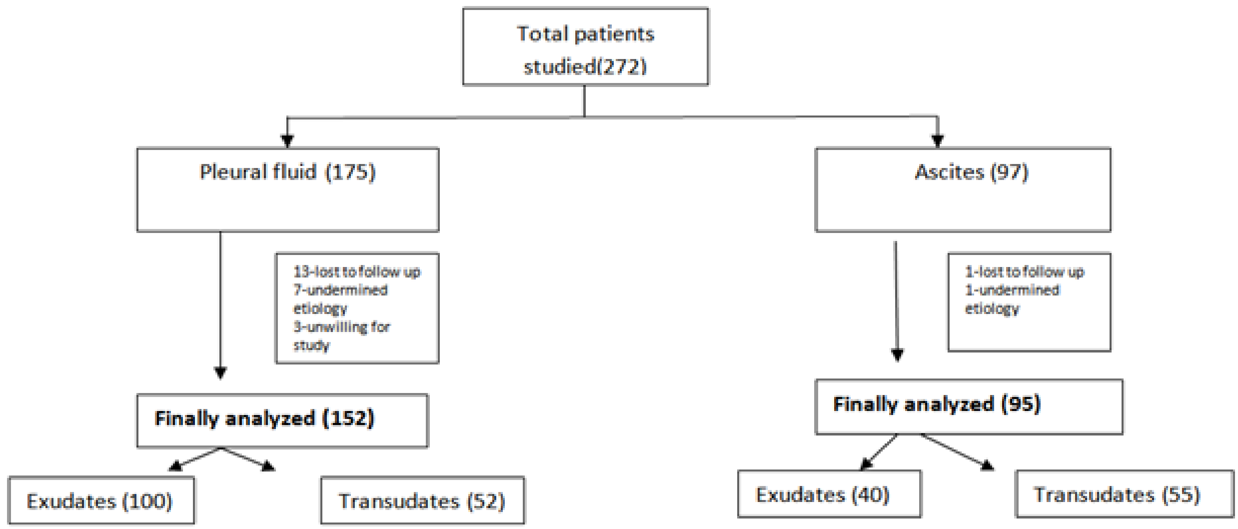
6WXG\ GHVLJQHG DQG DSSURYHG E\ LQVWLWXWLRQDO HWKLFV FRPPLWWHH 9DULRXV ELRPDUNHUV ZHUH HYDOXDWHG DQG SDWLHQW KLVWRU\ ZDV REWDLQHG SDWLHQWV ZHUH H[DPLQHG LQ D VWDQGDUG VHWWLQJ FRPPRQ VHQVH LQWUDGHUPDO DQG ILQH QHHGOH DVSLUDWLRQ VDPSOHV PDGH D GHFLVLRQ ERWK FDVHV ZHUH FRQVLGHUHG 7XEHUFXORVLV 7ZR GDWD 6WHS H QH[W VWHS ZDV JURVV H[DPLQDWLRQ

6WHS 6ZDE IRXQG FRPSOHWH ELRFKHPLFDO FHOOV ODEHOOHG DV LQIODPPDWRU\ 7DEOH 7DEOHV DQG

6WHS &\WRORJLFDO WKH D IOXLG ZDV DQDO\VHG ERWK QR LQIODPPDWRU\ FRORXU JURVV DSSHDUDQFH

6WHS)OXLG $'$ ZDV VHQW WR WKH IOXLG IRU WKH WXEHUFXODU HWLRORJ\ GLDJQRVLV SHUIRUPHG DV SDUW RI WKH VWDQGDUG GHVSRQGLQJ XSRQ WKH

6WHS 6HQVLWLYLW\ VSHFLILFLW\ RI WKHVH GLDJQRVWLF FULWHULD LQ LQIODPPDWRU\ DV WKH JROG VWDQGDUG ZLWK F\WRORJ\ DV WKH JROG VWDQGDUG



)LJXUH 6WXG\ FKDUW

/RFDWLRQ	,QIODPPDWRU\ ([XGDWLYH ,QLWLDO 'HQRPLQDWRU $EVHQFH RI (GHPD 'LVRUGHU	1RQ LQIODPPDWRU\ 7UDQVXGDWH ,QLW 3UHVHQFH RI +HDUW)DLOXUH RU 2HGHP
3OHXUDO	6LJQLILFDQW ZHLJKW ORVV 3OHXUDO HIIXVLRQ ZLWK G\VSQRHD /HIW VLGHG ORFDOLVHG FUDFNOHV DQG %URQFKLDO ,QWHUFRVWDO WHQGHUQHVV	%LODWHUDO HIIXVLRQ ZLWK RUWKRSQRHD 6LJQV RI KHSDWRFHOOXODU IDLOXUH
$VFLWHV	,VRODWHG DVFLWHV SDLQ WHQGHUQHVV	
)HDWXUHV RI PDOLJQDQF\ FRPPRQ WR DOO	6LJQLILFDQW ZHLJKW ORVV LQ ROG OHPSKDGHQRSDWK\ ZLWK HYLGHQFH RI PHGLDVWLQDO FRPSUHVVLRQ PDVVLYH SOHXUDO HIIXVLRQ ZLWKRXW PHGLDVWLQDO +DUG OLYHU %UHDVW QRGXOH 7K\URLG QRGXOH SDUDQHRSODVWLF PDQLIHVWDWLRQV DV *\QHFRPDVWLD FOXEELQJ PDVV LQ DEGRPHQ DULVLQJ IURP SDQFUHDV OLYHU RYDU\ LQWHVWLQDO OHIW VXSUDFODYLFXODU O\PSKDGHQRSDWK\ HQFURWL]LQJ GLVHDVH LQ WKH IRUP RI +HPRSW\VLV KHPDWHPHVLV	
)HDWXUHV RI WXEHUFXORVLV FRPPRQ WR DOO	0DWWHG O\PSK QRGHV UDGLRORJLFDO RU DSLFDO VHJPHQW RI ORZHU OREH DIIHFWLRQ ORZ JUDGH IHYHU ZHLJKW ORVV LQ \RXQJ	

7DEOH &OLQLFDO IHDWXUHV DQG VLJQV VXJJHVWLYH RI LQIODPPDWRU\

Parameter	Cut off for inflammatory	Cut off for Non inflammatory	References
Fluid protein	>3 g/dl	<3 g/dl	[1-4]
Fluid protein/serum protein ratio	>0.5	<0.5	[4-6]
Fluid protein-serum protein gradient	<3.1 g/dl	>3.1 g/dl	[4,7]
Fluid albumin-serum albumin grad	<1.2 g/dl	>1.2 g/dl	[4,6]
Absolute Fluid LDH	>200 U/L	<200 U/L	[6,8-10]
Fluid LDH/Serum LDH ratio	>0.6	<0.6	[4]
Fluid glucose	<60 mg/dl	>60 mg/dl	[11,12]
Fluid cholesterol	>45 mg/dl	<45 mg/dl	[4,8,12]
Cytology	Total leucocyte count >425 cells/ cumm	Total leucocyte count <425 cells/ cumm	[13]

Table 2: Criteria for pleural/pericardial effusions.

3DUDPHWHU	&XW RII LQIODPPDWRU\	&XW RII QRQ LQIODPPDWRU\	5HIHUHQFHV
)OXLG SURWHLQ J GO		J GO	> @
)OXLG SURWHLQ VHUXP SURWHLQ UDWLR	!		$V DSSOLHG IRU SOHXUDO IOXLG
)OXLG SURWHLQ VHUXP SURWHLQ JUDG	J GO	! J GO	$V DSSOLHG IRU SOHXUDO IOXLG
)OXLG DOEXPLQ VHUXP DOEXPLQ JUDG	J GO	! J GO	> @
$EVROXWH)OXLG /'+	8 /		> @
)OXLG /'+ 6HUXP /'+ UDWLR	!		> @
)OXLG JOXFRVH	PJ GO	! PJ GO	> @
&\WRORJ\	7RWDO FRXQW ! FXPP	7RWDO OHXFRF\WH FRXQW FXPP	OHXFRF\WH F>HOOV@

7DEOH &HULWHULD IRU DVFLWHV

3DUDPHWHU		6HQVLWLYLW\	6SHFLILFLW\	3FLW YDOXH
&OLQLFDO DVVHVVPHQW				
*URVV H[DPLQDWLRQ				
%LRFKHPLFDO IOXLG WRWDO SURWHLQ				
	)OXLG 3URWHLQ UDWLR			
	)OXLG 3URWHLQ JUDGLHQW			
	)OXLG DOEXPLQ JUDGLHQW			
	)OXLG /'+ /'+ UDWLR			
	)OXLG JOXFRVH			
	)OXLG $'$,8 /			
	)OXLG $'$,8 /			

7DEOH HHVXOWV~IXRUG DVFLWLF

'LVFXVVLRQ

3URWHLQ SDUDPHWHUV confirmation HR VHQVLWLYH WUDQVXGDWLYH IOXLGV QDWXUH RI

,Q RXU VWXG\ LUUHVSHFWLYH RI HWLF H[XGDWHV DQG ! IRU WUDQVXGDWHV H[XGDWHV DQG ! IRU WUDQVXGDWHV GLvHUHQWLDWLQJ WUDQVXGDWHV IURP WUDQVXGDWHV) PD\ IDOO LQ H[XGDWLYH UDQJH LQ SDW WUDQVXGDWLYH RQ SURORQJHG GLXUH WUDQVH[XGDWHV EXW WKH DOEXPLQ JU QDWXUH ,Q RXU VWXG\ DOEXPLQ JUDGL VSHFLRFLW\ 5RPHLUR HW DO DOVR SUR DOEXPLQ JUDGLHQW WR EH VXSHULRU W GLvHUHQWLDWLQJ WUDQVXGDWHV IURP H[XGDWHV PHFKDQLVP H[SODLQV WKH VHOHFWLYH RZLQJ WR WKH LQWUDYDVFXOD YROXPH GHSOHWHG IROORZLQJ WKH XVH

Albumin gradient in differentiating pleural effusions

Albumin gradient exudate /transudate	Cytologically inflammatory (100)	Cytologically non inflammatory (52)
Inflammatory/Exudate (Albumin gradient<1.2)	92	0
Non inflammatory/ Transudate (Albumin gradient >1.2)	8-Malignant pleural effusions	52
Sensitivity-92% (84.8 to 96.47) Specificity-100% (93.08-100) PPV-100%, NPV-86% Neg LR-0.08 (0.04 to 0.16) P<0.001		

Table 6: Albumin gradient in differentiating pleural effusions.

Results for pleural fluids

The protein gradient, albumin gradient were highly sensitive and specific irrespective of etiology. Though glucose ratio and fluid glucose were 100% specific but their sensitivity was low owing to their indecisive behaviour in non lymphomatous malignant pleural effusions (Table 4).

Parameter		Sensitivity	Specificity	P value
Clinical assessment		98%	94%	0.001
Gross examination		99%	92%	0.01
Bio chemicals	Fluid total protein	92%	93%	0.01
	Fluid Protein ratio	92%	93%	0.001
	Fluid Protein gradient	92%	97%	0.01
	Fluid albumin gradient	92%	100%	0.01
	Fluid LDH,LDH ratio	89%	92%	0.01
	Fluid glucose	85%	87%	0.01
	Fluid ADA (41IU/L)	94%	97%	0.01
	Fluid ADA (37 IU/L)	100%	97%	0.01

Table 4: Results for pleural fluids.

Results for ascitic fluids

Though the sensitivity of fluid total protein, protein ratio and protein gradient are same as albumin gradient, the specificity was less as compared to albumin gradient (Table 5).

5HODWLYH DFFXUDF\ RI SURWHLQ DQG DOEXPLQ JUDGLHQW LQ GRXEWIXO FDVHV

(WLRORJ\	1R	7RWDO 3URW ZLWK UDQJH	3URW 5DWLR ZLWK UDQJH	3URW *UDGLHQW ZLWK UDQJH	$OEXPLQ *UDGLHQW ZLWK UDQJH
		([! 7U	([7U!	([7U!	([7U!
&&)		([X	([X	WUDQV	WUDQV
+HSDWLF K\GURWKRUD[		([X	H[X	WUDQV	WUDQV

7DEOH 5HODWLYH DFFXUDF\ RI SURWHLQ DQG DOEXPLQ JUDGLHQW LQ GRXEWIXO FDVHV

XVLQJ 7DEOH ZH VHH WKDW WKH FDVHV RI &&) DQG KHSDWLF K\GURWKRUD[ZKLFK ZHUH SURWHLQ FRQFHQWUDWHG EHFDXVH RI ORQJ WHUP GLXUHWLF WKHUDS\ ZHUH ZHOO JUDGLHQW DQG DOEXPLQ JUDGLHQW

6$$* LQ GHWHUPLQLQJ WKH SDWKRORJLFDO QDWXUH RI DVFLWLF fluids

6$$* H[XGDWH WUDQVXGDWH	&\WRORJLFDO LQIODPPDWRU\	&\WRORJLFDO QRQ LQIODPPDWRU\
,QIODPPDWRU\ ([XGDWH Q 6$$*		
1RQ LQIODPPDWRU\ 7UDQVXGDWH 6$$*!	6%3 Q	0DOLJQDQW DVFLWHV

6HQVLWLYLW\	WR
6SHFLILFLW\	WR
1HJDWLYH /LNHOLKRRG 5DWLR	WR
3RVLWLYH 3UHGLFWLYH 9DOXH	WR
1HJDWLYH 3UHGLFWLYH 9DOXH	WR
3	

7DEOH 6$$* LQ GHWHUPLQLQJ WKH SDWKRORJLFDO QDWXUH RI DVFLWLF IOXLGV

XVLQJ 7DEOHV DQG ZH FDQ FRQFOXGH WKDW 6$$* KDV DQ HGJH LQ GLVWLQJXLVKLQJ WUDQVXGDWHV IURP H[XGDWHV EXW IDLOV LQ GLDJQRVLQJ 6%3 PDOLJQDQW DVFLWHV

6XSHULRULW\ RI 6$$* RYHU SOHXUDO IOXLG misclassified FDVHV RI 'DOO\

From Table 9, we can say that albumin gradient identifies false positive exudates as the best.

*OXFRVH UDWLR IRU H[XGDWHV DQG ! IRU WUDQVXGDWHV *OXFRVH UDWLR ! PJ GO IRU WUDQVXGDWHV H[XGDWLYH WUDQVXGDWHV

7DEOH 6XSHULRULW\ RI 6$$* RYHU SOHXUDO IOXLG FDVHV

PDOLJQDQW QRQ O\PSKRPDWRXV VHURVLWLV SDQFUHDWLF DVFLWLF IOXLGV GRZQ VHQVLWLYLW\ DQG VSHFLILFLW\ RI XQLYHUVDO FULWHULD /RZ OHYHOV RI JOXFRVH DQG /'+ RI QRQ WXEHUFXODU HPS\HPD DQG 6/(DUH H[SODLQHG E\ WKH GHFUHDVHG JOXFRVH DQG LQFUHDVHG XWLOL]DWLRQ LQ FDVHV

6LJQLILFDQFH RI VHUXP HVWLPDWLRQ GHPRQVWUDWHG WKDW RI QRUPDO VHUXP E\ D VOLJKW LQFUHDVH LQ WKH UHYHUVH H[XGDWHV GHFUHDVH LQ LVR/'+ DQG DQ LQFUHDVH PRUH WKDQ ULVH LQ LVR/'+ LV LQ PHVRWKHOLRPD H[FOXGHG 3RO\PRUSKR DQG WKDQ PRQRQXFOHDUV WKH KLJK SDUWO\ WR UHOHDVH RI WKHVH HQ]\PHV PRQRQXFOHDWH FHOOV

)OXLG FKROHVWHURO OHYHOV KDYH EHHQ XVHG WR GLIIHUHQWLDWH WUDQVXGDWHV DQG H[XGDWHV DQG UHFHQWO\ WKHUH KDYH EHHQ FKROHVWHURO DQG FKROHVWHURO FRQFHQWUDWLRQV

FK\OLH RU FKRO\ FRPSRVLWLRQ RI WKH HIIXVLRQ
FKROHVWHURO FRQFHQWUDWLRQ $ WUDGLWLRQDO RU JUDGLHQW
O\VLV RI HU\WKURF\WHV DQG OHXNRF\WHV
FKROHVWHURO DQG RWKHU OLSLG FRPSRXQGV IURP GHJHQHUDWLQJ FHOO
PHPEUDQHV WKHVH FRPSRXQGV DUH fWUDSSHGg LQ WKH SOHXUDO VSDFH E\ WKH
WKLFNHQHG SOHXUDO PHPEUDQHV (YHQWXDOO\ WKHVH OLSLG FRQVWLWXHQWV
EHFRPH FRQFHQWUDWHG DQG LPSDLU WKH PLON\ DSSHDUDQFH
> @H RFFXUUHQFH RI FKROHVWHURO HIIXVLRQ
ZLWKRXW SUHYLRXV WXEHUFXORVLV WKDW D PRUH DFWLYH EXW WKH
WR GHWHUPLQH WKDW SOHXUDO SURFHVV PD\ EH
FKROHVWHURO HIIXVLRQ WR H[SODLQ WKLV REVHUYDWLRQ
WKDW WKH SOHXUDO FKROHVWHURO LV GHULYHG IURP VHUXP OLSLGV
GHQVLW\ OLSRSURWHLQV /'/ WKDW DFFXPXODWH LQ WKH SOHXUDO VSDFH GXULQJ
DFXWH LQIODPPDWLRQ 2YHU WLPH OLSRSURWHLQ ELQGLQJ
VKLIW IURP /'/V WR KLJK GHQVLW\ OLSRSURWHLQV
IRU WKLV VKLIW OLSRSURWHLQ ELQGLQJ LV SRRUO\ XQGHUVWRRG

H UHODWLRQ EHWZHHQ WKH FKROHVWHURO
FRQWHQW FDQ EH H[SODLQHG E\ WKH FHOOXODU
RI OLSLG FRPSRQHQWV IURP WKH SKRVSKROLSLG ELOD\HU

,QFRQVLVWHQW FKROHVWHURO HIIXVLRQ
PDNHV LW VHOI FRQWUDGLFWRU\
~XLGV QRW DGYRFDWHG

5DWLRQDOH IRU UHO affirmation WR $'$ DQ
DQWLWXEHUFXODU WKHUDS\ 3UDFWLFDO XWLOLW\ RI $'$ FDQ LW EH
XVHG EOLQGO\ WR GLDJQRVH WXEHUFXODU VHURVLWLV"

%HLQJ FOLQLFLDQV ZH DUH PRUH ZRUULHG DERXW WKH
WRRO EHVLGH DQG VR DW WKH
LPPHQVLEHO\ LPSRUWDQW SUDFWLFDO

- &DQ $'$ DORQH VXEVWLWXWH RWKHU FRQYHQWLRQDO WHVWV IRU GLDJQRVLQJ WXEHUFXODU VHURVLWLV"
- 'R ZH QHHG WR ZDLW IRU UHVSRQVH WR WKHUDS\ WR UHWURVSHFWLYH GLDJQRVLV RI WXEHUFXORVLV $'$ OHYHOV WR VWDUW DQWLWXEHUFXODU WKHUDS\"
- +RZ IDU VXFFHVVIXO VKDOO LW EH WR LPSOHPHQW $'$ DV D SULPDU\ LQYHVWLJDWRU\ ZHDSRQ

7R VROYH WKHVH TXHVWLRQV OHWV
$)% E\ PLFURVFRS\ DQG $)% FXOWXUH
WKH HWLRORJ\ RI WXEHUFXORVLV
LQ FXOWXUH DQG LQ PRVW
+LVWRSDWKRORJLFDO HYLGHQFH RI WXEHUFXORVLV
DOVR LV UDUH WR GHPRQVWUDWH 1HZ
DPSOLILFDWLRQ '1$ E\ WKH 3&5 DQG FRPSDUDEOH V\VWHPV
GHPRQVWUDWH RQO\ WKH DQWLJHQ EXW
HQGHPLF DUHDV QRW DYDLODEOH IRU
GHYHORSLQJ FRXQWULHV OLNH ,QGLD DQG HVSHFLDOO\ LQ D UXUDO VHW XS OLNH
RXUV

$'$ DFWLYLW\ D PDUNHU RI 7 FHOO
LPPXQH UHVSRQVH
WXEHUFXODU 3OHXUDO
SOHXUDO WXEHUFXORVLV HW DO > @ GLG D
FRQGXFWHG EHWZHHQ DQG
SHUIRUPDQFH ZDV UHDVRQDEO\ JRRG
> @ HYHQ UHSRUWHG KLJK VHQVLWLYLW\
YDOXH DQG QHJDWLYH SUHGLFWLYH YDOXH LQ ODUJHU VDPSOH VL]H VWXGLHV

QLQ~DPPDWRU\ SOHXUDO HIIXVLRQV
8 /'/ IRXQG LW WR EH
RI $'$ FRQ
$'$ SRVLWLYLW\ ZDV
HVVHQWLDO WKDW D FRQFHQWUDWHV
1RQ /\PSKRPDWRXV
O\PSKRPDWRXV DQG S\RJHQLF HPS\
FKROHVWHURO FRQFHQWUDWLRQ
WKH FKROHVWHURO HIIXVLRQ
VHURVLWLV WKH FDXVH
DQDO\WH
UI WXEHUFXODU SOHXUL
VHURVLWLV $'$ 8 /'/
RI WXEHUFXODU SOHXUDO IRXQG
SHULWRQHDO
'LDJQRVLV RI WXEHUFXORVLV E\
LQ RXW RI FDVHV RI WXEHUFXODU VH
WKH EHJLQQLQJ RI WKHUDSHXWLF WULDO
PDOLJQDQF\ RQ IROORZ XS

6XPPDULVLQJ

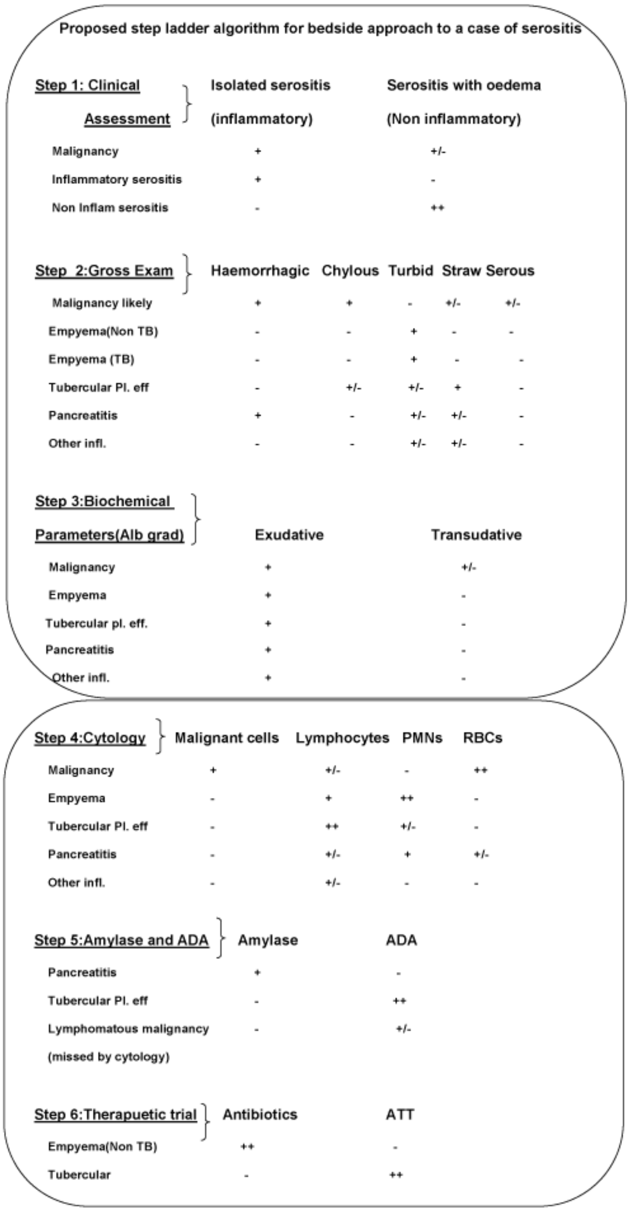
H PRVW IUHTXHQW GLVHDVH SUHVHQWLQJ
WXEHUFXORVLV LV WKH K\SHUVHQVLWLYLW\
DQWLJHQ

,W LV QR ZRQGHU WKDW GHPRQVWUDWLRQ
WXEHUFXORVLV RI WKH VHURXV
KLVWRSDWKRORJLFDO HYLGHQFH
WR JDLQ SUDFWLFH

H FOLQLFDO VXVSLFLRQ RI WXEHUFXORVLV
SURQRXQFHG

5HFRPPHQGDWLRQ

RU EHGVLGH DSSURDFK WR
DQ DOJRULWKP ZKLFK FDWHUV DOO VWHSV
FDVH RI VHURVLWLV 5LJKW IURP FOLQLFDO
WR FRQFOXGH WKDW WKH WHVW
DQG DSSOLFDELOLW\ RI HDFK SDUDPHWHU
FRUUHFW GLDJQRVLV IRU WXEHUFXORVLV
LV DQG VSHFLILFLW\ SRVLWLYH SUHGLFWLYH
GLDJQRVLV DUH RXWOLQHG DV IROORZV
LQ ODUJHU VDPSOH VL]H VWXGLHV


Proposed step ladder algorithm for bedside approach to a case of serositis
Step 1: Clinical Assessment
Isolated serositis (inflammatory)
Serositis with oedema (Non inflammatory)
Malignancy + +/-
Inflammatory serositis + -
Non Inflam serositis - ++
Step 2:Gross Exam
Haemorrhagic Chylous Turbid Straw Serous
Malignancy likely + + - +/- +/-
Empyema(Non TB) - - + - -
Empyema (TB) - - + - -
Tubercular Pl. eff - +/- +/- + -
Pancreatitis + - +/- +/- -
Other infl. - - +/- +/- -
Step 3:Biochemical Parameters(Alb grad)
Exudative Transudative
Malignancy + +/-
Empyema + -
Tubercular pl. eff. + -
Pancreatitis + -
Other infl. + -
Step 4:Cytology
Malignant cells Lymphocytes PMNs RBCs
Malignancy + +/- - ++
Empyema - + ++ -
Tubercular Pl. eff - ++ +/- -
Pancreatitis - +/- + +/-
Other infl. - +/- - -
Step 5:Amylase and ADA
Amylase ADA
Pancreatitis + -
Tubercular Pl. eff - ++
Lymphomatous malignancy (missed by cytology) - +/-
Step 6:Therapuetic trial
Antibiotics ATT
Empyema(Non TB) ++ -
Tubercular - ++

)LJXUH 3URSRVHG VWHS ODGGHU DOJRULWKP IRU EHGVLGH DSSURDFK WR D FDVH RI VHURVLWLV

6WHS %HGVLGH FOLQLFDO DVVHVVPHQW SLYRW DURXQG ZKLFK ZKROH RI WKH ZRUN XS RI D SDWLHQW RI VHURVLWLV URWDWHV

6WHS *URVV H[DPLQDWLRQ FRPELQHG WRJHWKHU ZLWK WKH FOLQLFDO DFXPHQ PD\ LWVHOI VXJJHVW D GLDJQRVLV ZLWK KLJK DFFXUDF\

6WHS %LRFKHPLFDO SDUDPHWHUV DQG DOEXPLQ JUDGLHQW VWDQGV DV DQ DFFHSWHG GLVFULPLQDWRU IRU GLIIHUHQWLDWLQJ EHWZHHQ LQIODPPDWRU\ DQG QRQ LQIODPPDWRU\ LUUHVSHFWLYH RI HWLRORJ\

6WHS &\WRORJ\ FRQILUPV WKH GLDJQRVLV RI PDOLJQDQF\ SDWKRORJLFDOO\ DQG LQ FDVH RI QR IXUWKHU ZRUN XS ZLWK WKLV LW VSO

DV DQ HWLRORJ\ RI PDOLJQDQF\ LQ FDVHV RI PDEOXQWLQFH ZKHQ ELRFKHPLFDO FULWHULD DUH DSSOLHG

6WHS $'$

0RVW IUHTXHQW GLVHDVH SUHVHQWLQJ WXEHUFXORVLV DQG LW LV VHQVLWLYLW\ SKHQRPHQRQ VHURVLWLV ZLWK GHPRQVWUDWLRQ RI $)% ED HvXVLRQ LQYDVLYH SURFHGXUH OLNH SOHXUD HYLGHQFH KDV ORZ RXWSXW DQG LV IXWLO

6LQFH O\PSKRF\WLF WXEHUFXORXV HvXVLRQ DUH DOVR VHHQ LQ WKH LQLWLDO JURVV H[JHWV GHWHFWHG FRQILUPDWLRQ RI PDOLJQDQF\ DW HWLRORJ\ RI VWUDZ FRORXUHG H[XGDWLYH

+LJK $'$ OHYHO HQKDQFHG SUREDELOLW\ HWLRORJ\ DW WKH WLPH RI SURYLVLRQDO

:LWK WKH FOLQLFDO VXVSLFLRQ RI WXEHUFXORVLV SURORQJHG IHYHU ORVV RI DSSHWLWH DQWLWXEHUFXODU WKHUDS\ IRU D SUR O\PSKRF\WLF HvXVLRQ ZLWK KLJK $'$ FRQWHQW DQG UHFRYHU\ E\ FOLQLFDO ZHLJKW JDLQ I DSSHWLWH DQG UDGLRORJLFDO PHDQV GL

:H KHQFH FRQVLGHU D VWHS ZLVH DSSURDFK ZLWK KLJK $'$ FRQWHQW DV D PDUNHU IRU WKH GLDJQRVLV RI WXEH

5HIHUHQFHV

&KDNNR & &DOGZHOO 6+ 6IRU]D 33 7UHDWPHQW IDLOXUH LQ WXEHUFXORVLV &KHVW

6KLQWR 5$ /LJKW 5: (IIXVLRQ 5 GLXUHVLV RQ WKH FK SOHXUDO SDWLHQWV ZLWK FRQJHVWLYH KHDUW MRXUQDO RI PHGLFLQH

5RPHUR &DQGHLUD 6)HUQDQGH] & 0DUWLQ & / ,Q~XHQFH RI GLXUHWLFV RQ WKH FRQFHQWUDWLRQ FRPSRQHQWV RI SOHXUDO WUDQVXGDWHV $PHULFDQ MRXUQDO RI PHGLFLQH

+vQH (U %URZQ /. %DUEHULO &$ 'LDJQR GLVFULPLQDWH EHWZHHQ H[XGDWLYH DQG 3ULPDU\ 6WXG\ ,QYHVWLJDWRUV &KHVW

/LJKW 5: 0DFJUHJRU 0, /XFKVLQJHU 3& % HvXVLRQV WKH GLDJQRVWLF VHSDUDWLRQ RI WU RI LQWHUQDO PHGLFLQH

3RUFHO 3HQD -0 9LFHQWH GH 9HUD & (VTXH %D\HVLDQ DQDO\VLV XVLQJ FRQWLQXRXV SOHXUDO H[XGDWHV 5HVSLUDWRU\ PHGLFLQ

5RPHUR &DQGHLUD 6)& 0DUWLQ & 6£QFKH] 3 ,Q~XHQFH RI GLXUHWLFV RQ WKH FRQFHQWUDW FRPSRQHQWV RI SOHXUDO WUDQVXGDWHV 0HG

:LOFR[0(&KRQJ &$ 6WDQEURRN 0% 7ULFFR RHV WKLV SDWLHQW KDYH DQ H[XGDWLYH SOHXUDO &OLQLFDO ([DPLQDWLRQ V\VWHPDWLF UHYLH

%RPHM :HLVFK & 'HPHO 8 7LO] *3) LQ~OWUDWLRQ UDSLGO\ DPSOLILHV SOHXUDO HPS\HPD LQWHUQDO PHGLFLQH

/LJKW 5: 0 /XFKVLQJHU 3& %DOO GLDJQRVWLF VHSDUDWLRQ RI WUDQVXGDWH PHGLFLQH

6DKQ 6$ &RPSUHKHQVLYH %URQFKLDO $ 0DUFHO FOLQLFDO IHDWXUHV RI GLVHDVH SOHXUDO

H 3OHXUD LQ +HDOWK DQG 'LVHDVH SS

.RHJHOHQ E 'HLFRQ $+ %ROOLJHU &7 3DUDSQHXPRQLF SOHXUDO HIIXVLRQV DQG HPS\HPD 5HVSLUDWLRQ ,QWHUQDWLRQDO 5HYLHZ RI 7KRUDFLF 'LVHDVHV

3DZDGH -8 5HYLVLWLQJ JDVWURLQWHVWLQDO WXEHUFXORVLV GLVFULPLQDWLRQ

$DVOG 0DQDJHPHQW RI DGXOW SDWLHQWV ZLWK DVFLWHV $PHULFDQ $VVRFLDWLRQ IRU WKH 6WXG\ RI /LYHU 'LVHDVHV

5RYHO 5 %DUWKRORPHZ /J &DLQ -F 0FNHQ]LH H YDOXH RI H[DPLQDWLRQ RI ERG\ IOXLGV IRU OLSLGV DQG IRU SURWHLQV E\ HOHFWURSKRUHVLV *DVWURHQWHURORJ\

5XQ\RQ %$ 0RQWDQR $$ $NULYLDGLV ($ H VHUXP DVFLWHV DOEXPLQ JUDGLHQW LV VXSHULRU WR WKH H[XGDWH WUDQVXGDWH FRQFHSW LQ WKH GLIIHUHQWLDO GLDJQRVLV RI DVFLWHV LQWHUQDO PHGLFLQH

5XQ\RQ %$ +RHIV -& 6SRQWDQHRXV EDFWHULDO SHULWRQLWLV LQWR GLDJQRVWLF SDUDFHQWHVLV WHFKQRORJ\

6XFK - 5XQ\RQ %$ 6SRQWDQHRXV EDFWHULDO SHULWRQLWLV LQIHFWLRXV GLVHDVHV FOLQLFDO $PHULFD 6RFLHW\ RI $PHULFD

5XQ\RQ %$ 0DQDJHPHQW RI DGXOW SDWLHQWV ZLWK DVFLWHV GXH WR FLUUKRVLV DQ XSGDWH +HSDWRORJ\ $VFLWLF DQG FKLORXV DVFLWHV GHWHFWLRQ +HSDWRORJ\ %DOWLPRUH 0G

0LWURX 3 .RXURV H WUDQV H[XGDWH

&DUU '7 0F*XFNLQ :) ~ XLJOH 3OHXUDO 6HULDO IOXLG FRQFHQWUDWLRQ IROORZLQJ RUDO DPLQR DFLG IRUPXOD ZLWK UKHXPDWRLG DUWKULWLV DQG FRQQHFWLYH WLVVXH $PHULFDQ UHYLHZ RI UHVSLUDWRU\ GLVHDVH

3DWLHQW -($LNDZD -. &KRXVH 5 &DUWHU 6HUYLFH ZLWK DVFLWHV

&KHQ 5 9DUJKHVH $)ROORZ-XS VWXGLHG ZLWK LVRWRSLF WHFKQLTXHV DQG

$]FK 2 + 3HDUO]HU %)DEHO + /LSRSURWHLQ OLSLGHPLD IRU SDWKRJHQHVLV

&KDUR\ %DUWKRORPHZ ,QWUDDEGRPLQDO

6HPHU VLQ 0 ,UYLQJ 0$ 5HOLJLRQ GLDJQRVWLF DQG FULWLFDO

0RLVH 6 $UEHU 7XEHUFXORVLV RI 1RQ $PHULFD

3LUURV * 'DNLV & %XGURQL 0 $QGUHRQL *

*RWR 1RJXFKL < .R\DPD + +LUD . 6KLPE

2FDQ D 0DUWLQH] 9D]TXH] -0 6HJXUD 50)HUQDQGH] 5RYH

&DXVHQ 1 'DQ -RVH (6DUDVROD /

9DOGHV / 6DQ -RVH ($OYDUH] ' 6DUDQGHV

'LDJQRVLV RI WXEHUFXORXV SOHXULV\ XVLQJ WKH ELRORJLF PDUNHUV DGHQRVLQH GHDPLQDVH DQG LQWHUIHURQ JDPPD

9DOGHV / 6DQ -RVH ($OYDUH] ' 6DUDQGHV 9 'HDPLQDVH O\VR]\PH DQG LQ

9DOGHV / $OYDUH] ' 5HOHYDQFH WR WKH RULJLQ RI LQFUHDVHG