

What is the Characteristics of Direct Clippable aneurysms Among 22 ICA Trunk Blood Blister-Like Aneurysms

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Introduction

To review major complications in procedures for blood blister-like aneurysms (BBAs) of the internal carotid artery (ICA).

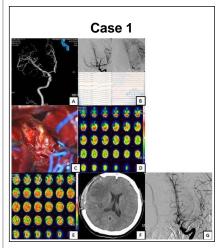
Methods

We reviewed retrospectively 1176 patients with aneurysmal subarachnoid hemorrhage at the Hallym Medical Center between January 2001 and January 2012. There were 31 ICA trunk aneurysms: The 22 BBA patients underwent clipping (n = 13), trapping (n = 2), endovascular procedures (n = 6), and wrapping (n = 1) treatments.

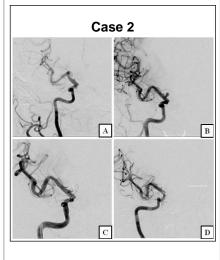
Case .	545.4	Age -	5104 -	121	1.	LSD.	Operation >	MIN .	Smoke .	Istra -	Pour a	Sau.	605
1.	τ.	65 A	84. ·	IV.,	n .	V(22,2) /	Trapping .	х,	Ν.	Υ.,	x.	N	1.
2.0	r .	44.5	8L .	ш.	Ξ.	D(2.4) ,	ANC a	N	х.	х.	х.	х.,	5.0
3.	r .	42.5	81.	ш.,	m .	D(5,2) -	ANC .	¥.s	N .	8.	N .	¥	1.
4.1	M ×	62.5	81.4	IV a	ш.	D(9.4) -	ANC A	Υ.	N.,	Y.s	N.,	х.,	2
5.4	T >	50 ×	EL >	п.	11 ×	D(8,5) >	ANC >	Y.	\mathbf{Y}_{2}	Y.s	N A	8.5	1.
6.	M -	47.5	81.0	W a	n.s	D(4.3) ,	ANC - (Sendt clip) -	N .s	Yo	Ya	N .	¥ s	3.
1.	P.i	63 ×	Ra .	шэ	ш.,	Y(5,4) .	GDC / (LAR) /	¥,	Y.s	8.5	N.,	¥.s	1.5
\$.,	τ,	35 .	81 .	n.,		V(4.2) ,	GDC. (Regional) -	¥.	х,	N .	¥.	¥.s	1.
\$1	T	66 A	Le .	IV a	W.	V(5.6).	ANC a	N	N .	¥.s	N.,	¥.s	5.4
10.5	F >	62 .	81.	н.,	ш.	V(5,6).	ANC >	¥.	N .	N.s.	N.,	N	3.1
п.	1.	59 A	81.	Π.	III .	D(6,3) -	Wrapping >	Y.	N	N .	Υ.	¥.s	1.4
12 .	τ.	49 .	L.	W a	II .	D(6,6) +	ANC (Sough clip)	N	N .	¥ s	N .	¥.	4.5
13 .	τ.	35 .	81.	ш.	ш.	D(5,5) -	ANC .	N	х.	¥.,	х.	¥.	5.
14.5	F.	43 .	Le »	п.	W.A.	D(3.6) >	ANC	¥.	N.)	¥.s	N.)	YA	5.
15 -	7.	42 .	EL .	W.s	II /	D(5.5) >	Trapping a	N.	N.3	¥.s	N.5	Y a	3.
16 5	1.	73.4	EL .	IV A	$\Pi^* :$	D(3.5) >	ANC .	\mathbf{N}_{2}	N a	Y a	No.	¥.	4.5
17 .	τ.	78.4	81.	TV A	ш.	D(6,5) -	GDC .	¥.s	N.,	х.	х.	N.	3 .
18 .	P :	55 s	EL .	Π,	Ξ.	D(5.4).	GDC (S+C)	N .s	N 3	\mathbf{N}_{A}	N.,	\mathbf{N}_{A}	4.5
19.5	1.	63 .	81.	ш.,	Ξ.	D(3,2) -	ANC .	¥.	N.,	Υ.,	х,	N.	5.
20.5	M a	50.5	B4 ×	Ш.,	шэ	D(6,4).>	GDC. (8+C+5) .	Y.s	N 3	Na	N .	N 3	4.5
22 .	r .	52 .	81.	Π.	п.	D(6.4) -	s+s, 1° C P°C tegenski	х,	х.	х.	х.	х.,	4.
22 .	M.	45 .	Le .	Π,	π.,	D(3.5) -	ANC I" . I"C tagtostk-	х,	х,	¥.s	х.	Χ.,	5,

Results

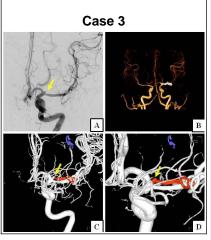
According to the location and size, there were 17 dorsal locations (mean size : 5.2mm, mean distance to cardinal branch : 4.2mm) and 5 ventral types (mean size : 5.8mm, mean distance to cardinal branch : 3.8mm). The average of the Hunt-Hess grade (H–H. G.) 3.0 and the Fischer grade (F. G.) were 3.2 respectively in the BBA cases. Twelve(54.5%) of the BBAs had intraoperative rupturing. The mean GOS was 3.14 and mortality rate was very high as 31.8%.



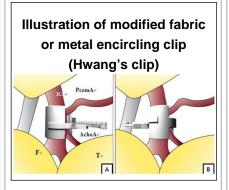
A 30 minutes- BOT with EEG(B) after the collateral circulations of anterior and posterior communicating artery were demonstrared by cerebral angiography(A). A short segment of BBA was trapped to the site of proximal posterior communicating artery during the surgery(C). Two serial SPECT were performed within 2 weeks(D). She had a change of consciousness at 14th days and there was some perfusion defect on SPECT (E), ipsilateral hemisphere low density on CT(F) and vasospasm on angiography(G).



Four angiographies show had 4 procedures : at first, double stent(A), the second, coiling with regrowth 2 months later(B), at third, another embolization with regrowth 4 months later(C) and at last, a remnant neck of BBA without a futher growth till 8months later(D).



The regrowth of incomplete clipping BBAs without trapping : initial angiography show Lt.ICA dorsal wall BBA(white arrow)(A), post op brain CTA without muscle packing(B), angiography after two weeks later(C), follow up angiography after coil embolization due to regrowth BBA.



A: Clip is designed as posterior side of blade is opened to avoiding unwanted obstruction of cardinal branches. B: Clip is designed as anterior side of blade was designed to prevent obliteration of cardinal branches.

Conclusions

Sometimes, small dorsal BBAs distant from the cardinal branches may be clippable without major complications during late learning curve. The cerebral blood flow and volume should be protected by endovascular procedures or high-flow bypass because the collateral circulation is guite vulnerable by vasospasm, although ICA sacrifice may be appropriate with balloon test occlusion for the trapping of BBAs. Nonetheless, the anterior choroidal artery is still vulnerable with any procedures. We suppose that a new design including ours is inevitable to avoid any complex procedures combined with obliteration of the cardinal branches.

Learning Objectives

Identify an effective treatment of blood blister-like aneurysm on the internal carotid artery