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Minimally-Invasive Surgery in Intracerebral Hemorrhage: An Updated Systematic Review and Meta-Analysis of Randomized Controlled Trials.

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Learning Objectives

By the conclusion of this session, participants should be able to:

- 1) Summarize the literature supporting MIS in Intracerebral Hemorrhage
- 2) Compare MIS with conventional treatments
- 3) Understand the impact of time to evauation and hematoma volume of outcome of minimally-invasive surgery

Introduction

Minimally invasive surgery (MIS) for intracerebral hemorrhage (ICH) has been evaluated in numerous clinical trials. While meta-analyses for this strategy have been performed in the past, new recent trials add important information and permit strategy-specific analyses of endoscopic surgery (ES) and stereotactic thrombolysis (STS).

Methods

Using the Cochrane systematic approach and the PRISMA 2009 guidelines, major scientific databases including but not limited to the Pubmed, CENTRAL, Embase, Web of Science, Scopus, and the Chinese National Knowledge Infrastructure(CNKI) were searched until October of 2017 for randomized controlled trials on MIS treatment of supratentorial spontaneous ICH.

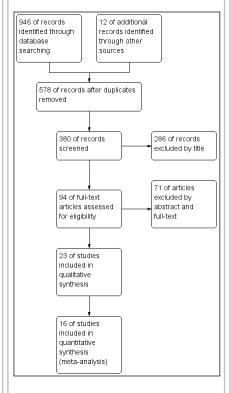
<u>Primary outcome</u> was defined as death or dependence at the end of follow-up.

<u>Secondary outcome</u> was defined as death.

Functional dependence classified by activities of daily living scales: mRS >2; BI =60; GOS =3

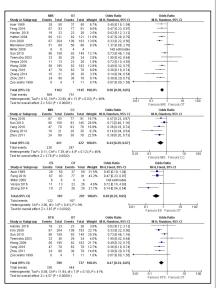
Results

The initial search yielded 958 reports which were initially screened to 380 documents and finally reduced to 16 high-quality RCTs involving 2397 patients.



We analyzed MIS overall, ES, and STS compared with conventional treatment(CT) including medical treatment and/or conventional craniotomy(CC).

Primary outcome:

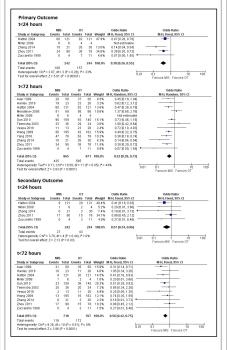


Secondary outcome:

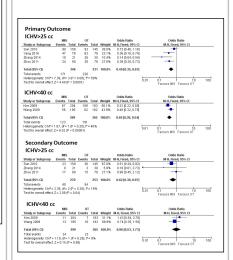
	MIS		01			Odds Ratio		Odds Ratio	
Study or Subgroup						M-H, Fixed, 95% CI		M-H, Fixed, 95% CI	_
Auer 1989	21	50		50	13.5%	0.31 [0.14, 0.71]			
Cho 2006	2	60 93	4 8	30 91	3.4% 5.0%	0.22 (0.04, 1.30)			
Feng 2016 Harriev 2016	10	23		26	3.9%	1.05 (0.34, 2.15)			
Hatteri 2004	10	121	20	121	12.3%	0.41 (0.18, 0.93)			
Kim 2004	11	704	7	183	4.6%	1.43 (0.54, 3.78)			
Miller 2008	11	204		183	1.3%	0.2010.01.3.661			
Sun 2010	23	159		145	21.4%	0.51 10.29 0.921		-	
Teemstra 2003	20	36	20	34	6.1%	0.88 (0.34, 2.26)			
Vesna 2016	20	13	11	26	4.1%	0.25 (0.05, 1.35)			
Wang 2009	13	195		182	10.3%	0.74 (0.35, 1.59)			
Zhang 2014		21	3	30	1.9%	0.18 (0.01, 3.73)	+		
Zhou 2011	17	90	19	78	11.0%	0.72 (0.35, 1.51)			
Zuccasello 1999	п	4	3	11	1.7%	0.27 (0.01, 6.46)	_		
Total (95% CI)		1075		1011	100.0%	0.58 [0.45, 0.75]		•	
Total events	135		195						
Heterogeneity: Chi*=				P= 0%			0.01	01 10 11	J
Test for overall effect	Z = 4.10	(P < 0.0)	0001)				0.01	Favours MIS Favours OT	
	MIS		CC			Odds Ratio		Odds Ratio	
Study or Subgroup						M-H, Fixed, 95% CI		M-H, Fixed, 95% CI	_
Cha 2006	2	60	4	30	8.0%	0.22 [0.04, 1.30]			
Feng 2016	6	93	8	91	11.8%	0.72 [0.24, 2.15]			
Sun 2010	23	159	36	145	50.1%	0.51 [0.29, 0.92]		-	
Zhang 2014	17	21 90	19	30	4.4%	0.18 [0.01, 3.73]			
Zhou 2011	17	20	19	78	25.7%	0.72 [0.35, 1.51]			
Total (95% CB		423		374	100.0%	0.55 [0.37, 0.83]		_	
Total events	48	46.0	70	014	10000	one forest areas		-	
		400 =					_		-
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Heterogeneity: ChiP = Test for overall effect:				0%			0.01	0.1 10 10 Favours MIS Favours CC	ď
Test for overall effect:	Z= 2.89 i ES	P=0.0	01 01			Odds Ratio	0.01	Favours MIS Favours CC Odds Ratio	o o
	Z= 2.89 i ES	P=0.0	01 01		Weight	Odds Ratio M-H, Fixed, 95% CI	0.01	Favours MIS Favours CC	ď
Test for overall effect:	Z = 2.89 i ES Events 21	P = 0.0 Total 50	01 01		Weight 52.2%		0.01	Favours MIS Favours CC Odds Ratio	-
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Test for overall effect: Study or Subgroup Augr 1989 Feng 2016 Miler 2008	Z= 2.89 (ES Events 21 6 1	P = 0.0 Total 50 93 6	07 Events 35 8 2	Total 50 91 4	52.2% 19.4% 5.1%	M-H, Fixed, 95% CI 0.31 [0.14, 0.71]	0.01	Favours MIS Favours CC Odds Ratio	-
Testfor overall effect: Study or Subgroup Auar 1989 Feng 2016 Miller 2008 Vespa 2016	Z= 2.89 (ES Events 21 6 1 2	P = 0.0 Total 50 93 6 13	04) OY Events 35 8 2	Total 50 91 4 26	52.2% 19.4% 5.1% 15.9%	M-H, Fixed, 95% CI 0.31 [0.14, 0.71] 0.72 [0.24, 2.15] 0.20 [0.01, 3.66] 0.25 [0.05, 1.35]	0.01	Favours MIS Favours CC Odds Ratio	-
Test for overall effect: Study or Subgroup Augr 1989 Feng 2016 Miler 2008	Z= 2.89 (ES Events 21 6 1	P = 0.0 Total 50 93 6	07 Events 35 8 2	Total 50 91 4	52.2% 19.4% 5.1%	M-H, Fixed, 95% CI 0.31 [0.14, 0.71] 0.72 [0.24, 2.15] 0.20 [0.01, 3.86]	0.01	Favours MIS Favours CC Odds Ratio	_
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Test for overall effect: Study or Subgroup Augr 1989 Fang 2016 Miller 2008 Vespa 2016 Zhang 2014 Total (95% CI)	Z= 2.89 (ES Events 21 6 1 2 0	P = 0.0 Total 50 93 6 13	0Y Events 35 8 2 11	Total 50 91 4 26 30	52.2% 19.4% 5.1% 15.9%	M-H, Fixed, 95% CI 0.31 [0.14, 0.71] 0.72 [0.24, 2.15] 0.20 [0.01, 3.66] 0.25 [0.05, 1.35]	0.01	Favours MIS Favours CC Odds Ratio	-
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Test for overall effect: Study or Subgroup Auar 1989 Fang 2016 Miller 2008 Vesps 2016 Zhang 2014 Total (95% CI) Total ovents Heterogeneity Chil* =	Z= 2.89 (ES Events 21 6 1 2 0 30 2.15, df=	F=0.0 Total 50 93 6 13 21 183 4 (P=	07 Events 35 8 2 11 3 69 0.71); P=	Total 50 91 4 26 30 201	52.2% 19.4% 5.1% 15.9% 7.3%	M.H, Fixed, 95% CI 0.31 [0.14, 0.71] 0.72 [0.24, 2.15] 0.20 [0.01, 3.06] 0.25 [0.05, 1.35] 0.18 [0.01, 3.73]		Favours MIS Favours CC Odds Ratio	_
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We also conducted a subgroup analysis considering time from ICH onset to surgery and ICH volumes:

Time to treatment:



ICH volume:



Conclusions

- 1) MIS for ICH is significantly better than CT and CC, especially before 24 and 72 hours and for ICH volumes >25 and <40mL.
- 2) MIS, ES, and STS are significantly better than CT to achieve the primary outcome.
- 3) MIS and ES however, also achieved the secondary outcome of decreased mortality while STS did not.

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