|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Study** | **N0 of pts** | **Method of biliary stenting** | **Technical success** | | | **Clinical success** | | | **Adverse events** | | **Reintervention** | | | | | **Survival (days)** | | | | | | |
| **Overall** | **Biliary** | **Duodenal** | **Overall** | **Biliary** | **Duodenal** | N0 of pts | Time of AE (days) | N0 of pts | RBO | Time to RBO (days) | RDO | Time to RDO (days) | N0 of pts | Mean | Median | SD | 95% CI | IQR | Range |
| ENDOSCOPIC DOUBLE STENTING | Kaw, 2003 | 18 | ERCP | 17 | 18 | 17 | 16 | 18 | 16 | 1 | NA | 4 | 2 | mean: 56.5 | 2 | mean: 40.5 | 12 | - | 78 | - | - | - | - |
| Vanbiervliet, 2004 | 18 | ERCP | 17 | 17 | 18 | NA | | | 0 | NA | 0 | - | - | - | - | 57 | - | - | - | - | - | 30-120 |
| Choi, 2005 | 23 | ERCP, PTD | 23 | 23 | 23 | NA | | | 0 | NA | 1 | 1 | NA | - | - | NA | | | | | | |
| Olsen, 2005 | 29 | ERCP | 29 | 29 | 29 | 29 | 29 | 29 | 1 | 0.5 | NA | | | | | NA | - | 47 | - | - | - | 0-274 |
| Maire, 2006 | 23 | ERCP | 21 | NA | NA | NA | | | 0 | NA | 5 | 5 | NA | - | - | NA | - | 330 | - | - | - | 21-879 |
| Sulieman, 2006 | 14 | ERCP | 13 | 14 | 13 | NA | | | 0 | NA | NA | | | | | NA | - | - | 256 | - | - | 31-627 |
| Wang, 2006 | 20 | PTD | 20 | 20 | 20 | 20 | 20 | 20 | 0 | NA | 0 | - | - | - | - | NA | 150 | - | - | - | - | 30-420 |
| Akinci, 2007 | 9 | PTD | 9 | 9 | 9 | 8 | 9 | 8 | 1 | 9 | 1 | 1 | mean: 60 | - | - | 9 | 73 | - | - | - | - | - |
| Hou, 2007 | 12 | PTD | 11 | 11 | 12 | 11 | 11 | 12 | 0 | NA | NA | | | | | NA | | | | | | |
| Mutignani, 2007 | 64 | ERCP, PTD | 64 | 64 | 64 | 57 | 64 | 57 | 16 | NA | 12 | 5 | mean: 96 (range: 37-195) | 7 | mean: 138 (range: 20-278) | NA | - | 81 | - | - | - | 2-447 |
| Moon, 2009 | 8 | ERCP | 7 | 7 | 8 | 7 | 7 | 8 | 1 | NA | NA | | | | | NA | - | 91 | - | - | - | 36-314 |
| Iwamuro, 2010 | 7 | EUS-BD | 7 | 7 | 7 | 7 | 7 | 7 | 2 | NA | NA | | | | | NA | | | | | | |
|  | **Study** | **N0 of pts** | **Method of biliary stenting** | **Technical success** | | | **Clinical success** | | | **Adverse events** | | **Reintervention** | | | | | **Survival (days)** | | | | | | |
| **Overall** | **Biliary** | **Duodenal** | **Overall** | **Biliary** | **Duodenal** | N0 of pts | Time of AE (days) | N0 of pts | RBO | Time to RBO (days) | RDO | Time to RDO (days) | N0 of pts | Mean | Median | SD | 95% CI | IQR | Range |
| ENDOSCOPIC DOUBLE STENTING | Katsinelos, 2010 | 39 | NA | 32 | 36 | 33 | 32 | 36 | 33 | 3 | NA | 9 | 4 | median: 270 (range: 60-660) | 5 | median: 90 (range: 30-360) | NA | - | 180 | - | - | - | 60-660 |
| Keranen, 2010 | 57 | ERCP, PTD | 101 | 101 | 111 | NA | | | NA | NA | 15 | 15 | NA | - | - | NA | | | | | | |
| Zheng, 2010 | 22 | ERCP | 20 | 20 | 22 | 20 | 20 | 22 | 0 | NA | 0 | - | - | - | - | NA | | | | | | |
| Li, 2011 | 18 | NA | 18 | 18 | 18 | 17 | 18 | 17 | 1 | 5 | NA | | | | | 17 | - | 258 | - | - | - | 90-510 |
| Price, 2011 | 42 | ERCP, PTD | 42 | 42 | 42 | 39 | 40 | 39 | 3 | NA | 10 | 5 | NA | 5 | NA | NA | - | 85.2 | - | - | - | 4-320 |
| Ardengh, 2012 | 22 | NA | 21 | NA | NA | NA | | | 3 | NA | 3 | NA | median: 120 (range: 60-480) | NA | median: 60 (range: 30-240) | NA | - | 180 | - | - | - | 60-540 |
| Hamada, 2012 | 33 | ERCP | NA | | | NA | | | NA | NA | 17 | 17 | median: 64 | - | - | NA | | | | | | |
| Kanno, 2012 | 21 | ERCP, PTD, EUS-BD | 21 | 21 | 21 | 18 | 21 | 18 | 3 | NA | NA | NA | median: 141 | NA | median: 75 | NA | - | 55 | - | 1-109 | - | - |
| Khashab, 2012 | 9 | EUS-BD | 9 | 9 | 9 | 9 | 9 | 9 | 3 | NA | NA | | | | | 4 | 94 | - | - | - | - | 10-367 |
| Kim, 2012 | 24 | ERCP, PTD | 24 | 24 | 24 | 24 | 24 | 24 | 19 | 6 | 14 | 11 | median: 110 (range: 30-1054) | 3 | median: 41.5 (range: 6-371) | NA | - | 195.5 | - | - | - | 21-725 |
|  | **Study** | **N0 of pts** | **Method of biliary stenting** | **Technical success** | | | **Clinical success** | | | **Adverse events** | | **Reintervention** | | | | | **Survival (days)** | | | | | | |
| **Overall** | **Biliary** | **Duodenal** | **Overall** | **Biliary** | **Duodenal** | N0 of pts | Time of AE (days) | N0 of pts | RBO | Time to RBO (days) | RDO | Time to RDO (days) | N0 of pts | Mean | Median | SD | 95% CI | IQR | Range |
| ENDOSCOPIC DOUBLE STENTING | Maluf-Filho, 2012 | 5 | EUS-BD | 5 | 5 | 5 | 3 | 3 | 3 | 2 | NA | NA | | | | | NA | | | | | | |
| Kushnir, 2013 | 62 | ERCP, PTD | 46 | 46 | 62 |  |  |  | 0 | NA | 24 | 13 | median: 39 days (range: 2-477) | 11 | median: 82 (range: 2-343) | NA | - | 119 | - | - | - | 6-546 |
| Pan, 2013 | 10 | ERCP, EUS-BD | 10 | 10 | 10 | 10 | 10 | 10 | 2 | NA | NA | | | | | NA | | | | | | |
| Tonozuka, 2013 | 11 | ERCP, EUS-BD | 11 | 11 | 11 | 11 | 11 | 11 | 3 | 22 | NA | NA | mean: 25.5±9.2 | NA | | NA | 76.5 | - | 67.8 | - | - | - |
| Valeshabad, 2013 | 35 | ERCP, PTD, EUS-BD | 102 | 102 | 35 | 102 | 102 | 35 | NA | NA | 2 | 2 | NA | - | - | NA | | | | | | |
| Waidmann, 2013 | 17 | ERCP | 17 | 17 | 17 | 17 | 17 | 17 | NA | NA | 6 | NA | | NA | | NA | | | | | | |
| Canena, 2014 | 50 | ERCP, PTD | 50 | 50 | 50 | 50 | 50 | 50 | 223 | 294 | 20 | 17 | NA | 11 | mean: 294 | 50 | 127 (95% CI: 95-160) | 72 | - | 12.8-23.2 | - | 8-560 |
| Carvalho, 2014 | 50 | ERCP, PTD | 50 | 50 | 50 | 50 | 50 | 50 | NA | NA | 20 | 17 | mean: 238 | 11 | mean: 189 | NA | 84 | - | - | - | - | - |
|  | **Study** | **N0 of pts** | **Method of biliary stenting** | **Technical success** | | | **Clinical success** | | | **Adverse events** | | **Reintervention** | | | | | **Survival (days)** | | | | | | |
| **Overall** | **Biliary** | **Duodenal** | **Overall** | **Biliary** | **Duodenal** | N0 of pts | Time of AE (days) | N0 of pts | RBO | Time to RBO (days) | RDO | Time to RDO (days) | N0 of pts | Mean | Median | SD | 95% CI | IQR | Range |
| ENDOSCOPIC DOUBLE STENTING | Hamada, 2014 | 20 | ERCP, EUS-BD | 19 | 19 | 20 | NA | | | 2 | NA | 8 | 8 | EUS-BD: median: 32 days | - | - | EUS-BD: 1 | - | EUS-BD: 112 | - | - | - | - |
| ERCP: median: 53 days | ERCP: 2 | - | ERCP: 164 | - | - | - | - |
| Khashab, 2014 | 35 | ERCP, PTD, EUS-BD | 33 | 33 | 35 | 33 | 33 | 35 | 1 | NA | 1 | 1 | mean: 17 | - | - | 11 | 151 | - | - | - | - | 35-530 |
| Lee, 2014 | 45 | PTD | 45 | 45 | 45 | 39 | 39 | NA | 4 | 131 | 11 | 11 | NA | - | - | 41 | - | 62 | - | 8-116 | - | - |
| Yu, 2014 | 17 | ERCP | 17 | 17 | 17 | 10 | 13 | 14 | 4 | NA | 3 | 3 | mean: 90 | - | - | 17 | 192 | - | - | - | - | 70-332 |
| Di Mitri, 2015 | 35 | ERCP | 35 | 35 | 35 | NA | | | 0 | NA | 2 | 2 | mean: 195 | - | - | NA | - | 180 | - | - | - | 90-240 |
| Kubo, 2015 | 44 | ERCP, PTD | 44 | 44 | 44 | 40 | 44 | 40 | 6 | NA | NA | NA | median: 156 (95% CI: 41-105) | NA | median: 53 (95% CI: 14-286) | NA | - | 95 | - | 33-328 | - | - |
| Manta, 2015 | 15 | ERCP, EUS-BD | 13 | 13 | 13 | 12 | 13 | 12 | 3 | NA | 2 | NA | | NA | | NA | - | 120 | - | - | - | 90-240 |
| Matsumoto, 2015 | 47 | ERCP, EUS-BD | 46 | 46 | 47 | 46 | 46 | 47 | 3 | NA | 17 | 13 | NA | 8 | NA | NA | - | 73 | - | - | - | 17-325 |
|  | **Study** | **N0 of pts** | **Method of biliary stenting** | **Technical success** | | | **Clinical success** | | | **Adverse events** | | **Reintervention** | | | | | **Survival (days)** | | | | | | |
| **Overall** | **Biliary** | **Duodenal** | **Overall** | **Biliary** | **Duodenal** | N0 of pts | Time of AE (days) | N0 of pts | RBO | Time to RBO (days) | RDO | Time to RDO (days) | N0 of pts | Mean | Median | SD | 95% CI | IQR | Range |
| ENDOSCOPIC DOUBLE STENTING | Sanchez-Ocana, 2015 | 61 | ERCP, EUS-BD | 60 | 61 | 60 | NA | | | 4 | NA | 32 | 23 | NA | 9 | NA | 50 | 86 | - | 37 | - | - | - |
| Sano, 2015 | 21 | NA | 21 | 21 | 21 | 20 | NA | NA | 2 | NA | 9 | 4 | median: 70 (range: 1-259) | 5 | median: 56 (range: 1-289) | NA | | | | | | |
| Williamson, 2015 | 7 | NA | NA | | | NA | | | NA | NA | NA | | | | | NA | - | 330 | - | - | - | 15-1005 |
| Fu, 2016 | 22 | PTD | NA | | | 21 | NA | NA | 15 | 3 | NA | | | | | 21 | 161 | - | 76 | - | - | - |
| Ogura, 2016 | 39 | EUS-BD | NA | | | NA | | | 8 | NA | NA | NA | EUS-CDS: median: 43 days | NA | EUS-CDS: median: 42 days | NA | | | | | | |
| EUS-HGS: median: 133 days | EUS-HGS: median: 113 days |
| Paik, 2016 | 43 | ERCP, PTD | 43 | 43 | 43 | 39 | 39 | NA | 8 | NA | 5 | NA | | NA | | NA | | | | | | |
| Sato, 2016 | 43 | ERCP, EUS-BD | NA | | | 36 | 43 | 36 | 8 | NA | 15 | 15 | 104 | - | - | 43 | - | 59 | - | 4-541 | - | - |
| Yao, 2016 | 42 | ERCP | 30 | 30 | 42 | NA | | | NA | NA | NA | | | | | NA | | | | | | |
| Zhao, 2016 | 20 | PTD | 18 | 20 | 18 | 15 | NA | 15 | 19 | 5 | NA | | | | | 18 | - | 288 | - | - | - | 150-630 |
|  | **Study** | **N0 of pts** | **Method of biliary stenting** | **Technical success** | | | **Clinical success** | | | **Adverse events** | | **Reintervention** | | | | | **Survival (days)** | | | | | | |
| **Overall** | **Biliary** | **Duodenal** | **Overall** | **Biliary** | **Duodenal** | N0 of pts | Time of AE (days) | N0 of pts | RBO | Time to RBO (days) | RDO | Time to RDO (days) | N0 of pts | Mean | Median | SD | 95% CI | IQR | Range |
| ENDOSCOPIC DOUBLE STENTING | Bulut, 2017 | 21 | PTD | 21 | 21 | 21 | NA | | | NA | NA | NA | | | | | NA | | | | | | |
| Fukushima, 2017 | 15 | NA | 15 | 15 | 15 | NA | | | 12 | NA | NA | | | | | NA | - | 110 | - | - | - | - |
| Gutierrez, 2017 | 7 | EUS-BD | 7 | 7 | 7 | 6 | 6 | 7 | 0 | NA | 2 | 2 | NA | - | - | NA | | | | | | |
| Hamada, 2017 | 110 | ERCP, EUS-BD | NA | | | 105 | 105 | NA | 154 | NA | 37 | 37 | ERCP: median: 455 days | - | - | 96 | - | 199 | - | - | 116-388 | - |
| EUS-CDS: median: 344 days | NA | | | | | | |
| EUS-HGS: median: 137 days | NA | | | | | | |
| Hori, 2017 | 109 | ERCP, PTD | 108 | 109 | 108 | 89 | NA | NA | 75 | NA | 38 | 25 | median: 87 (95% CI: 52.9-111.1) | 13 | median: 76 (95% CI: 51.3-100.7) | NA | - | 92 | - | 72.9-111.1 | - | - |
| Kim, 2017 | 58 | ERCP | 58 | 58 | 58 | NA | | | 7 | 2.6 ± 1.7 (range: 1-7) | 7 | 7 | mean: 2.6 ± 1.7 (range: 1-7) | - | - | NA | | | | | | |
| Lee, 2017 | 12 | ERCP, PTD | 11 | 12 | 11 | 10 | 11 | 11 | 0 | NA | 1 | NA | | NA | | 12 | 91.9 | - | - | - | - | 15-245 |
|  | **Study** | **N0 of pts** | **Method of biliary stenting** | **Technical success** | | | **Clinical success** | | | **Adverse events** | | **Reintervention** | | | | | **Survival (days)** | | | | | | |
| **Overall** | **Biliary** | **Duodenal** | **Overall** | **Biliary** | **Duodenal** | N0 of pts | Time of AE (days) | N0 of pts | RBO | Time to RBO (days) | RDO | Time to RDO (days) | N0 of pts | Mean | Median | SD | 95% CI | IQR | Range |
| DOUBLE STENTING | Matsumoto, 2017 | 81 | ERCP, EUS-BD | 67 | 67 | NA | NA | | | 31 | NA | 31 | 21 | median: 249 (range 17-384) | 10 | median: 125 (range 58-172) | 81 | 73 | - | - | - | - | 20-954 |
| Rai, 2017 | 12 | ERCP, EUS-BD | 12 | 12 | 12 | NA | | | 1 | NA | NA | | | | | NA | - | 66.25 | - | - | - | 14-149 |
| Staub, 2018 | 71 | ERCP | 60 | 60 | 71 | 57 | 57 | 71 | 3 | NA | 18 | NA | | NA | | 71 | 138 | **-** | **-** | **-** | **-** | **-** |
| Yamao, 2018 | 39 | ERCP, EUS-BD | 28 | 28 | 39 | 26 | 26 | 39 | 15 | NA | NA | NA | ERCP: 54.4 | NA | | NA | - | ERCP: 79.5 | **-** | **-** | **-** | **-** |
| EUS-BD: 57.5 | EUS-BD: 80 |

Table, SDC2. Outcomes of studies dealing with endoscopic double stenting

AE – adverse event; RBO – recurrent biliary obstruction; RDO – recurrent duodenal obstruction; SD – standard deviation; CI – confidence interval; IQR – interquartile range; ERCP – endoscopic retrograde cholangio-pancreatography; EUS-BD – endoscopic ultrasound guided biliary drainage; PTD – percutaneous transhepatic drainage; NA – not available

1 Technical success was only assessed for simultaneous biliary and duodenal stent placement (N=11)

2 Technical and clinical success was only assessed for ERCP

3 A total of 30 adverse events were reported in 22 patients

4 A total of 17 adverse events were reported in 15 patients

5 Adverse events did not include RBO and RDO