**Supplementary information**

**Figure S1. Study population**



**Table S1. Background of groups with and without preoperative angiography**

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| --- |
| **Patient characteristics** |
|  | All glioblastoma (n=133) | Preoperative angiography (n=91) | Non-preoperative angiography (n=42) | *P* |
| Age in years, median, IQR | 64 [52–72] | 64 [52–71] | 67 [52–74] | 0.56 |
| Men, n (%) | 80 (60.2) | 61 (67.0) | 19 (45.2) | 0.02 |
| **Baseline neurological findings** |
| Modified Rankin Scale, median, IQR | 2 [2–4] | 2 [1–4] | 2 [2–4] | 0.75 |
| Karnofsky Performance Status, median, IQR | 70 [50–85] | 70 [50–80] | 70 [50–90] | 0.85 |
| **The degree of removal** |
| Biopsy, n (%) | 23 (17.3) | 10 (11.0) | 13 (31.0) | 0.005 |
| Maximum safe removal, n (%) | 110 (82.7) | 81 (89.0) | 29 (69.1) |
| Maximum safe removal | Partial removal, n (%) | 30 (22.6) | 20 (22.0) | 10 (23.8) | 0.31 |
| Total (>90%) removal, n (%) | 80 (60.2) | 61 (67.0) | 19 (45.2) |
| **Adjuvant therapy** |
| Non-adjuvant therapy, n (%) | 4 (3.0) | 2 (2.2) | 2 (4.8) | 0.46 |
| Chemotherapy and radiation therapy, n (%) | 125 (94.0) | 87 (95.6) | 38 (90.5) |
| Only radiation therapy, n (%) | 2 (1.5) | 1 (1.1) | 1 (2.4) |
| Only chemotherapy, n (%) | 1 (0.8) | 0 (0) | 1 (2.4) |
| Others, n (%) | 1 (0.8) | 1 (1.1) | 0 (0) |
| Avastin, n (%) | 44 (33.1) | 26 (28.6) | 18 (42.9) | 0.10 |
| **Molecular features** |
| IDH mutation, n (%) | 5 (4.2) | 3 (3.8) | 2 (5.3) | 0.70 |
| MGMT methylation, n (%) | 32 (31.4) | 23 (32.4) | 9 (29.0) | 0.74 |
| MIB1 index, median, IQR | 0.3 [0.2–0.4] | 0.3 [0.2–0.4] | 0.2 [0.2–0.4] | 0.35 |
| **Follow-up duration** |
| Follow-up duration, months median, IQR | 17 [9–26] | 17 [9–26] | 14 [9–26] | 0.64 |

**Table S2. Effects of the patient group (preoperative angiography vs. non-preoperative angiography) on death and progression**

|  |  |  |
| --- | --- | --- |
| Preoperative angiography vs. non-preoperative angiography | Crude HR (95% CI) | *P* |
| Death | 0.82 (0.55–1.22) | 0.33 |
| Progression | 0.77 (0.52–1.13) | 0.18 |

**Table S3. Diagnostic method for IDH mutation and MGMT methylation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | All (n=91) | Non-early venous filling (n=44) | Early venous filling (n=47) | *P* |
| IDH mutation | Genetic diagnosis, n (%) | 30 (37.5) | 13 (35.1) | 17 (39.5) | 0.69 |
| Pathological diagnosis, n (%) | 50 (62.5) | 24 (64.9) | 26 (60.5) |
| MGMT methylation | Genetic diagnosis, n (%) | 30 (42.3) | 13 (39.4) | 17 (44.7) | 0.65 |
| Pathological diagnosis, n (%) | 41 (57.8) | 20 (60.6) | 21 (55.3) |

**Table S4. Background for the 20 cases undergone pathological examination**

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| --- |
| **Patient characteristics** |
|  | Non-Early venous filling (n=10)  | Early venous filling (n=10) | *P* |
| Age in years, median, IQR | 45.5 [39.5–70.5] | 63 [55.5–70] | 0.23 |
| Men, n (%) | 6 (60) | 5 (50) | 0.65 |
| **Baseline neurological findings** |
| Modified Rankin Scale, median, IQR | 2 [1–2] | 3 [1–4] | 0.23 |
| Karnofsky Performance Status, median, IQR | 70 [70–90] | 75 [68–83] | 0.46 |
| **The degree of removal** |
| Biopsy, n (%) | 0 (0) | 0 (0) | - |
| Maximum safe removal, n (%) | 10 (100) | 10 (100) |
| Total (>90%) removal, n (%) | 7 (70) | 6 (60) | 0.64 |
| **Molecular features** |
| IDH mutation, n (%) | 2 (28.6) | 0 (0) | 0.07 |
| MGMT methylation, n (%) |  3 (50) | 2 (20) | 0.21 |
| MIB1 index, median, IQR | 0.2 [0.2–0.3] | 0.3 [0.1–0.4] | 0.78 |

**Table S5.  “Pink” vessels considered to be vascular mimicry**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | All (n=20) | Non-early venous filling (n=10) | Early venous filling (n=10) | *P* |
| Score 2, n (%) | 5 (25) | 0 | 5 (50) | 0.02 |
| Score 1, n (%) | 7 (35) | 3 (30) | 4 (40) |
| Score 0, n (%) | 6 (30) | 5 (50) | 1 (10) |
| Not diagnosable, n (%) | 2 (10) | 2 (20) | 0 |