**Supplementary Methods**

Because we could not obtain the original data of APA, the NORMINV formula was used to generate a group of normally distributed random numbers by entering the corresponding mean and SD of each variable. Then, Mann-Whitney U test was used to compare the non-normally distributed continuous variables of APAC with APA. Additionally, the Student’s *t*-test (for normally distributed continuous variables) and the chi-square test and Fisher’s exact probability test (for categorical variables) were used to compare differences in characteristics between APAC and APA. Significance was considered when *P <* 0.05.

Survival time was calculated from the initial diagnosis of the adrenal mass to death, or it was censored at the end of follow-up. Recurrence-free survival time was defined as the time elapsing from the initial adrenal tumor diagnosis to censoring at tumor recurrence or death. Kaplan–Meier survival analysis was used to calculate the survival curves and recurrence-free survival curves. Cox regression analysis was used to determine the predictive factors for the prognosis.

**Supplementary Table 1. Basic information about all APAC cases**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Case No. | Author | Publication year | Age(years)/gender | Blood pressure (mmHg) | Serum potassium (mmol/L) | Maximum diameter of the tumor (cm) | Tumor weight (g) | Metastasis | Prognosis |
| 1 | Foye[1] | 1955 | 60/M | 200/135 | 1.8 | 4.0 | / | - | Died 7 months later |
| 2 | Brooks[2] | 1957 | 40/M | 230/120 | 2.5 | 21.0 | 1400 | - | Died 1 month later |
| 3 | Kandrac[3] | 1957 | 44/F | 200/110 | 3.8 | / | / | - | / |
| 4 | Jackson[4] | 1958 | 24/F | 130/90 | 5.5 | 3.0 | 36 | - | Remained alive within 7-month follow-up |
| 5 | Zimmerman[5] | 1959 | 38/F | 200/130 | 2.1 | / | 583 | + | / |
| 6 | Guang[6] | 1963 | 51/F | 190/110 | 3.0 | 4.5 | 18.5 | - | Remained alive within 1.5-year follow-up |
| 7 | De Andrade[7] | 1965 | 24/M | 180/130 | 3.9 | 15.0 | / | + | / |
| 8 | Crane[8] | 1965 | 64/F | 200/102 | 2.3 | 16.0 | 1010 | + | Died 3 months later |
| 9 | Marquezy[9] | 1965 | 15/F | 200/100 | 2.6 | / | / | - | / |
| 10 | Knapton[10] | 1965 | 59/F | 230/130 | 1.8 | / | / | - | / |
| 11 | Santander[11] | 1965 | 50/F | 160/110 | 2.6 | / | 90 | + | Died 1 month later |
| 12 | Alterman[12] | 1969 | 68/M | 210/110 | 2.1 | 4.5 | 30 | + | Died 1 month later |
| 13 | Filipecki[13] | 1972 | 34/F | 200/110 | 2.2 | / | 320 | - | Remained alive within 6-month follow-up |
| 14 | Miyazaki[14] | 1973 | 31/M | 234/130 | / | 6.0 | 450 | - | Remained alive within 16.6-year follow-up |
| 15 | Salassa[15] | 1974 | 52/M | / | / | / | / | - | Remained alive within 16-month follow-up |
| 16 | Grim[16] | 1981 | 19/F | 150/115 | 3.4 | 10.0 | 150 | - | Remained alive within 2-month follow-up |
| 17 | Taylor[17] | 1982 | 53/M | 180/100 | 1.9 | 9.0 | 320 | - | Remained alive within 3-year follow-up |
| 18 | Slee[18] | 1983 | 41/F | 160/110 | 2.6 | 12.0 | / | - | Died 4 months later |
| 19 | Telner[19] | 1983 | 27/F | 200/120 | 2.3 | / | / | - | Died 2 months later |
| 20 | Arteaga[20] | 1984 | 56/M | 200/100 | 1.4 | 3.5 | 18.6 | + | Died 2 years later |
| 21 | Arteaga[20] | 1984 | 47/F | 170/100 | 2.0 | 8.0 | / | - | Died 11 years later |
| 22 | Arteaga[20] | 1984 | 32/F | 200/130 | 1.7 | / | 246 | - | Died 3 years later |
| 23 | Chen[21] | 1984 | 55/M | 180/110 | 1.8 | 13.0 | 1440 | - | Remained alive within 14-day follow-up |
| 24 | Greathouse[22] | 1984 | 47/F | 210/100 | 2.5 | 3.0 | / | - | Remained alive within 2-year follow-up |
| 25 | Lüscher[23] | 1984 | 58/F | 180/100 | 1.4 | / | / | - | Remained alive within 13-month follow-up |
| 26 | Lüscher[23] | 1984 | 43/M | 205/125 | 1.7 | / | / | - | Remained alive within 10-month follow-up |
| 27 | Scott[24] | 1986 | 41/M | 270/140 | 1.9 | 8.0 | 180 | - | Remained alive within 3.5-year follow-up |
| 28 | Scott[24] | 1986 | 42/M | 180/110 | 2.6 | 7.0 | 60 | - | Remained alive within 2-year follow-up |
| 29 | Scott[24] | 1986 | 54/F | 250/120 | 1.8 | 11.0 | 280 | - | Remained alive within 6-month follow-up |
| 30 | Shenker[25] | 1986 | 47/F | 200/118 | 1.6 | / | / | - | Died 6 months later |
| 31 | Shenker[25] | 1986 | 43/M | / | 2.3 | 5.0 | / | - | / |
| 32 | Shenker[25] | 1986 | 54/F | 220/100 | 1.8 | 11.0 | / | - | / |
| 33 | Farge[26] | 1987 | 40/F | 200/100 | 1.9 | 13.0 | / | - | Died 6 months later |
| 34 | Farge[26] | 1987 | 51/M | 220/130 | 1.4 | 35.0 | 1230 | + | Died 5 months later |
| 35 | Farge[26] | 1987 | 56/F | 226/114 | 3.2 | 6.0 | 84 | - | Remained alive within 10-month follow-up |
| 36 | Farge[26] | 1987 | 17/M | 188/132 | 2.3 | 15.0 | 285 | - | Remained alive within 1-year follow-up |
| 37 | Fraser[27] | 1987 | 27/M | 250/150 | 3.0 | 5.0 | / | - | Remained alive within 1.6-year follow-up |
| 38 | Isles[28] | 1987 | 47/F | 240/115 | 2.8 | 5.6 | 50 | - | Remained alive within 1-year follow-up |
| 39 | Tenschert[29] | 1987 | 58/F | 180/110 | 2.6 | / | / | - | Died 5 months later |
| 40 | Panesar[30] | 1988 | 69/F | 180/90 | 2.7 | / | / | + | Died |
| 41 | Pascual[31] | 1990 | 65/M | 140/80 | 1.7 | 20.0 | / | - | Remained alive within 1-year follow-up |
| 42 | Touitou[32] | 1992 | 44/M | 250/150 | 2.6 | 6.0 | 150 | - | Died |
| 43 | Ludvik[33] | 1993 | 47/M | 180/110 | 2.5 | 3.0 | / | - | Died 14 months later |
| 44 | Puvaneswary[34] | 1993 | 53/F | 180/110 | 2.5 | 19.0 | 855 | - | / |
| 45 | Weingärtner[35] | 1995 | 29/M | 180/120 | 2.4 | 3.0 | / | - | / |
| 46 | Feller[36] | 1997 | 42/M | 180/120 | 1.8 | 12.0 | / | + | Died  |
| 47 | Taylor[37] | 1997 | 41/F | 146/98 | 1.8 | 11.0 | 220 | - | Remained alive within 2.5-year follow-up |
| 48 | Sakai[38] | 1997 | 45/F | / | 2.7 | 14.0 | 470 | - | Remained alive within 9-year follow-up |
| 49 | Muthusethupathi[39] | 1998 | 40/M | 120/80 | 2.3 | 6.0 | / | - | Remained alive within 3-month follow-up |
| 50 | Deckers[40] | 1999 | 74/M | 170/90 | 2.9 | 2.0 | / | - | Died 2.3 years later |
| 51 | Yoshimoto[41] | 2000 | 61/F | 150/100 | 1.4 | 7.0 | / | - | Remained alive within 7-month follow-up |
| 52 | Kang[42] | 2001 | 55/M | 150/105 | 2.77 | 11.9 | / | - | Remained alive within 6-month follow-up |
| 53 | Kang[42] | 2001 | 24/M | 165/90 | 2.54 | 11.0 | / | - | Died 4 months later |
| 54 | Dixon[43] | 2001 | 25/M | 200/140 | 1.7 | 3.0 | / | - | Died 1.75 years later |
| 55 | Dixon[43] | 2001 | 34/M | 170/120 | 2.0 | 7.0 | / | - | Died 4 years later |
| 56 | Mishra[44] | 2001 | 16/F | / | / | 20.0 | 500 | - | / |
| 57 | Hisamatsu[45] | 2001 | 79/F | / | / | / | / | - | Died 4 months later |
| 58 | Sweeney[46] | 2002 | 52/F | 160/110 | 2.7 | 8.0 | 44 | - | Remained alive within 1-year follow-up |
| 59 | Zhang[47] | 2003 | 28/M | 200/130 | 2.0 | 16.0 | / | - | Died 8 months later |
| 60 | Kurtulmus[48] | 2004 | 26/F | 150/100 | 2.0 | 8.0 | 185 | - | Remained alive within 3-year follow-up |
| 61 | Barzon[49] | 2005 | 42/M | 200/120 | 2.2 | 5.0 | / | - | Died 2 years later |
| 62 | Müssig[50] | 2005 | 61/F | 160/94 | 2.2 | 4.2 | 150 | - | Remained alive within 1-year follow-up |
| 63 | Tong[51] | 2005 | 37/M | 170/125 | 2.23 | 13.3 | / | - | Remained alive within 10-day follow-up |
| 64 | Seccia[52] | 2005 | 33/F | 160/95 | / | 5.5 | / | - | Remained alive within 9-year follow-up |
| 65 | Seccia[52] | 2005 | 63/F | / | / | 3.2 | / | - | Died 2 years later |
| 66 | Sun[53] | 2005 | 43/M | 206/110 | 3.1 | 5.0 | 70 | - | Remained alive within 3-month follow-up |
| 67 | Quan[54] | 2006 | 37/F | 140/110 | 2.8 | 9.5 | 496 | + | Remained alive within 3-month follow-up |
| 68 | Ali[55] | 2007 | 25/M | / | / | 8.5 | 90 | - | / |
| 69 | Carmona-Bayonas[56] | 2007 | 69/F | / | / | 8.0 | / | - | Remained alive within 11-month follow-up |
| 70 | Fareau[57] | 2007 | 65/M | 200/90 | 2.0 | 3.0 | / | - | Remained alive within 8-month follow-up |
| 71 | Abma[58] | 2008 | 52/F | 190/100 | 3.0 | 4.0 | 51 | - | Died 4.25 years later |
| 72 | Hermsen[59] | 2008 | 31/- | 180/100 | 2.6 | 9.0 | 110 | - | Remained alive within 25-year follow-up |
| 73 | Hu[60] | 2009 | 36/M | 200/110 | 2.42 | / | / | - | Remained alive within 8-year follow-up |
| 74 | Kuo[61] | 2009 | 20/M | / | 3.3 | 4.5 | / | - | Remained alive within 2-month follow-up |
| 75 | Peppa[62] | 2009 | 59/F | 170/100 | 2.7 | 6.5 | / | - | Remained alive within 1-year follow-up |
| 76 | Terui[63] | 2010 | 48/F | / | 3.8 | 5.4 | / | - | / |
| 77 | Beom[64] | 2011 | 72/M | 120/60 | 1.9 | 7.9 | / | + | Died 14 days later |
| 78 | Hsieh[65] | 2011 | 82/F | 220/119 | 1.9 | 13.0 | / | - | Remained alive within 4-month follow-up |
| 79 | Liu[66] | 2011 | 54/F | 180/100 | 1.98 | 8.5 | / | - | / |
| 80 | Späth[67] (8 cases) | 2011 | 54/M | / | 3.3 | 10.0 | / | - | / |
| 81 |
| 82 | 54/F |
| 83 |
| 84 |
| 85 |
| 86 |
| 87 |
| 88 | Song[68] | 2012 | 32/F | 130/80 | 2.5 | 4.2 | / | - | Remained alive within 7-day follow-up |
| 89 | Aghamohammadzadeh[69] | 2013 | 22/F | 190/100 | 2.7 | 6.0 | / | - | Remained alive within 365-day follow-up |
| 90 | Xu[70] | 2013 | 56/M | / | / | 8.5 | / | + | / |
| 91 | Xu[70] | 2013 | 22/M | / | / | 26.0 | / | - | / |
| 92 | Agha[71] (3 cases) | 2014 | 55/F | / | 1.7 | 5.2 | / | - | Died 1.6 years later |
| 93 | Remained alive within 2.5-year follow-up |
| 94 | 55/M | Remained alive within 2-year follow-up |
| 95 | Chowdhury[72] | 2014 | 37/F | 180/110 | 1.5 | 6.0 | / | + | Died 11 months later |
| 96 | Griffin[73] | 2014 | 76/F | 136/69 | 3.8 | 5.5 | 49.5 | - | Remained alive within 2.3-year follow-up |
| 97 | Hussain[74] | 2015 | 42/M | 140/80 | / | 2.0 | / | - | Remained alive within 2-year follow-up |
| 98 | Gundara[75] | 2015 | 77/M | 160/- | / | 2.8 | / | - | Remained alive within 2.5-year follow-up |
| 99 | Molina-Ayala[76] | 2015 | 40/M | / | 4.5 | 20.0 | 2750 | - | Died 9 months later |
| 100 | Nakano[77] | 2015 | 65/F | 160/80 | 2.2 | 7.0 | / | - | Remained alive within 4.5-year follow-up |
| 101 | Daga[78] | 2017 | 22/M | / | 2.9 | 11.0 | / | - | Remained alive within 3-month follow-up |
| 102 | Uchida[79] | 2017 | 37/F | 140/88 | 3.2 | 11.5 | 410 | - | Remained alive within 1-year follow-up |
| 103 | Baradhi[80] | 2018 | 67/F | 200/- | 2.7 | 14.0 | / | + | Remained alive within 3-year follow-up |
| 104 | Lazaro[81] | 2018 | 19/M | 180/100 | 2.7 | 7.0 | 62 | - | / |
| 105 | Yang[82] | 2018 | 49/F | 200/100 | 2.8 | 5.0 | / | - | / |
| 106 | Yang[83] | 2019 | 54/F | 189/110 | 1.6 | 5.5 | 26.5 | - | Remained alive within 9-month follow-up |
| 107 | Wang[84] | 2020 | 55/M | 200/120 | 2.2 | 8.6 | / | + | Remained alive within 7-month follow-up |
| 108 | Case 1 | / | 33/M | 250/190 | 1.93 | 8.4 | 255 | - | Remained alive within 9-months follow-up |
| 109 | Case 2 | / | 28/F | 140/106 | 1.6 | 8.5 | 125 | - | Remained alive within 7-year follow-up |
| 110 | Case 3 | / | 70/M | 196/105 | 2.06 | 7.0 | 46.2 | - | Died 2 years later |
| 111 | Case 4 | / | 35/F | 140/86 | 2.95 | 5.5 | 24.5 | - | / |

Abbreviations: APAC aldosterone-producing adrenocortical carcinoma, M male, F female

**Supplementary Table 2. Clinical features of four APAC cases**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No. | Age(years)/gender | Symptoms | Blood pressure (mmHg) | Plasma potassium level (mmol/l) | Side of adrenal tumor | Tumor size (cm) | Tumor mass weight (g) | Metastasis | PAC (ng/dl) | PRA  | Cortisol excess | Pathology results | Immunohisto-chemistry results | Treatment | Prognosis |
| 1 | 33/M | blurred vision, nocturia, weakness of lower limbs | 250/190 | 1.93 | left | 8.4×8.2×6.3 | 255 | absent | 496 | 14.58 μIU/ml | present | nodule with a clear margin and central necrosis | Ki67 10-15%, MART-1 +, CR +, Syn + | surgery, regional radiotherapy | remained alive without recurrence within the nine-month follow-up |
| 2 | 28/F | repetitive weakness and numbness of four extremities | 140/106 | 1.6 | left | 8.5×6.5×4.5 | 125 | absent | 39.53 | 0.04 ng/ml/h | present | vascular and capsular invasion, necrosis, fibrous bands and diffuse architecture | Ki76 10%, MART-1 + | surgery, chemotherapy, immunotherapy | lung metastases developed two years later, but remained alive within the seven-year follow-up |
| 3 | 70/M | no obvious symptoms | 196/105 | 2.06 | right | 7.0×3.5×2.5 | 55 | absent | 32.63 | 0.07 ng/ml/h | absent | mainly composed of clear cells in cytoplasm with mitotic rate of 5/50 HPF, focal necrosis and capsular invasion | Ki67 10%, MART-1 +, Syn +, α-inhibin + | surgery | tumor recurred at the 9th moth and died at the 12th month |
| 4 | 35/F | no obvious symptoms | 140/86 | 2.95 | right | 5.5×4.0×2.5 | 24.5 | absent | 24.37 | 0.08 ng/ml/h | absent | obvious pleomorphism of tumor cells, necrosis, a mitotic rate of ＞ 20/20 HPF and atypical mitoses | Ki67 8-10%, MART-1 +, CR +, α-inhibin + | surgery | lost follow-up |

Abbreviations: APAC aldosterone-producing adrenocortical carcinoma, M male, F female, PAC plasma aldosterone concentration, PRA plasma renin activity, HPF high-power fields.

**Supplementary Table 3. Clinical characteristics of APAA patients reported in the literature**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Article | Number of patients | Age (years) | Gender (M/F)  | Duration of disease (months) | Systolic blood pressure (mmHg) | Diastolic blood pressure (mmHg) | Hypokalemia (present/absent) (n,%) | Plasma potassium level(mmol/l) | Maximum tumor diameter (cm) | PAC (ng/dL) | PRA (ng/ml/h) | ARR\* |
| 2008 Walz[85] | 127 | 47.8±13.1 | / | 81.6±82.8 | 152.8±22.0 | 90.6±14.7 | / | / | 1.6±0.8 | / | / | / |
| 2008 Letavernier[86] | 109 | 47.8±10.6 | 42/67 | 60.0 (24.0-132.0) | 156.0±23.0 | 98.0±14.0 | / | 3.3±0.6 | 1.6±0.6 | 44.6 (39.8-50.0) | / | 3.1 (2.7-3.5) |
| 2011 Ishidoya[87] | 174 | 52.0±11.4 | 93/81 | 120.0 | / | / | / | 3.1  | / | 22.6  | 0.2  | 3.8 |
| 2011 Wu[88] | 100 | 49.6±13.3 | 42/58 | / | / | / | / | 3.6±0.8 | / | 49.2±40.5 | 1.5±4.4 | / |
| 2014 Iwakura[89] | 102 | 51.0±1.3 | 52/50 | 132.0±12.0 | 154±2.3 | 94±1.4 | / | 3.5±0.1 | / | 26.2±1.9 | 0.4±0.1 | 5.5±0.7 |
| 2014 Miyake[90] | 1050 | / | / | / | 154.0±23.0 | 92.0±15.0 | / | / | / | / | / | / |
| 2014 Monticone[91] | 131 | 48.0±1.0 | 67/64 | / | 169.0±2.0 | 103.0±1.0 | / | 3.0±0.06 | 1.5 (1.0-2.0) | 45.3 (33.3-58) | 0.2 (0.14-0.4) | 7.6 |
| 2018 Tang[92] | 392 | 38.4±7.8 | 173/219 | 113.5±87.6 | 180.6±26.6 | 109.2±14.9 | 89.66%/10.34% | 2.5±0.6 | 1.9±0.8 | 24.2±7.0 | / | 4.6±3.7 |
| 2018 Xiao[93] | 147 | 45 (37-52) | 63/84 | 60.0 (24.0-120.0) | 175.0 (160.0-180.0) | 100.0 (100.0-110.0) | / | 2.9 (2.6-3.1) | / | 29.4 (22.1-45.7) | 0.38 (0.2-0.7) | 2.94 (1.5-5.9) |
| 2019 Shariq[94] | 152 | 51.6±10.8 | 88/64 | 120.0 (54.0-192.0) | 143.4±18.7 | 85.4±12.2 | 138(90.8%)/14(9.2%) | 3.5±0.7 | / | 36.7±47.5 | 0.7±0.8 | 2.1±2.5 |

Abbreviations: APAA aldosterone-producing adrenocortical adenoma, M male, F female, PAC plasma aldosterone concentration, PRA plasma renin activity, ARR aldosterone to renin ratio.

\* ARR was calculated as the multiple of the cut-off point (30 ng/dl per ng/ml/h)

**Supplementary Table 4. Location of metastasis and time to recurrence in APAC patients**

|  |  |  |  |
| --- | --- | --- | --- |
|  | At the initial diagnosis (n) | At the time of tumor recurrence (n) | Time to tumor recurrence (months)† |
| Liver | 7 | 19 | 9.0 (1.0-97.3) |
| Lung | 7 | 8 | 14.7 (3.0-48.7) |
| Lymph nodes | 3 | 4 | 48.7 (12.0-85.2) |
| Bone | 3 | 3 | 7.0 (3.0-24.0) |
| Vena cava | 1 | 1 | 97.3 |
| Adrenal gland | - | 18 | 12.0 (3.0-164.3) |
| Brain | - | 1 | 9.0 |
| Pericardium | - | 1 | 6.0 |

† Results were expressed as median plus range.

Abbreviations: PA primary aldosteronism, APAC aldosterone-producing adrenocortical carcinoma

**Supplementary Table 5. Imaging features of APAC**

|  |  |
| --- | --- |
| Imaging feature | Number of patients |
| Heterogeneous density | 14 |
| Calcification | 12 |
| Organ displacement | 8 |
| Intra-mass hemorrhages | 4 |
| Hypervascularization | 3 |
| Necorsis | 5 |
| Irregular margin | 2 |

Abbreviations: APAC aldosterone-producing adrenocortical carcinoma

The number of patients could not reflect the true imaging features of APAC patients, because most APAC case reports did not describe the detailed information of the images.

**Supplementary Table 6. Pathological characteristics of APAC**

|  |  |
| --- | --- |
| Pathological characteristic | Number of patients |
| Nuclear grade III or IV | 6 |
| Mitotic rate ＞5/50 HPF | 24 |
| Atypical mitoses | 8 |
| Clear cells in cytoplasm ≤25% | 10 |
| Diffuse architecture of tumor cells | 12 |
| necrosis | 29 |
| Venous structure invasion | 33 |
| Sinusoidal structure invasion | 8 |
| Tumor capsule invasion | 36 |
| Weiss score ≥3 | 31 |
| Weiss score of 1-2 | 32 |

Abbreviations: APAC aldosterone-producing adrenocortical carcinoma, HPF high-powered fields

Only 31 patients had a Weiss score ≥3, because detailed pathological information is lacking in most APAC case reports, especially those published before the Weiss criteria was proposed.

**Supplementary Table 7. Items for suspecting APAC before surgery**

|  |  |  |
| --- | --- | --- |
| Variables | Sensitivity | Specificity |
| Tumor size ＞2.8 cm | 96.8% | 95.0% |
| Elevated fold change of ARR ＞2.5 | 85.2% | 50.0% |
| PAC ＞24.2 ng/dL | 85.0% | 50.0% |

Abbreviations: APAC aldosterone-producing adrenocortical carcinoma, ARR aldosterone to renin ratio, PAC plasma aldosterone concentration, PA primary aldosteronism.

**Supplementary Table 8. Presurgery diagnostic criteria with high specifity for clinically diagnosing APAC**

|  |  |  |
| --- | --- | --- |
| Variables | Sensitivity | Specificity |
| Metastasis | 37.5% | 100.0% |
| Tumor size ＞3.5 cm | 88.4% | 99.5% |
| Elevated fold change of ARR ＞4.6 | 70.4% | 99.5% |
| PAC ＞38.4 ng/dL | 62.5% | 99.5% |
| Elevated androgen levels | 7.3% | approximately 100.0% |
| Serum potassium level ＜2.7 mmol/L | 63.6% | 99.5% |
| Systolic blood pressure ＞177 mmHg | 66.3% | 99.5% |
| Diastolic blood pressure ＞107 mmHg | 54.8% | 99.5% |

Abbreviations: APAC aldosterone-producing adrenocortical carcinoma, ARR aldosterone to renin ratio, PAC plasma aldosterone concentration, PA primary aldosteronism.

**Supplementary Figure 1 Survival and recurrence-free survival rates in PA induced by APAC**

**Supplementary Figure 1.a**



Median survival time: 1460 days (SE, 425; 95% CI, 607–2293)

**Supplementary Figure 1.b**



Median time for both tumor recurrence and death: 365 days (SE, 97; 95% CI, 219–511)

**Supplementary Figure 1.c**



Median survival time for non-metastasis patients: 1550 days (95% CI, 0–3687) , median survival time for metastasis patients: 146 days (95% CI, 0–436), *P* ≤ 0.01

Abbreviations: PA primary aldosteronism, APAC aldosterone-producing adrenocortical carcinoma, SE standard error, CI confidence interval

**References**

1. Foye LV Jr, Feichtmeir TV. Adrenal cortical carcinoma producing solely mineralocorticoid effect. *Am J Med* 1955;19:966-75. doi: 10.1016/0002-9343(55)90163-7.
2. Brooks RV, Mc SR, Prunty FT, Wood FJ. Potassium deficiency of renal and adrenal origin. *Am J Med* 1957;23:391-407. doi: 10.1016/0002-9343(57)90319-4.
3. Kandrac MS, Zikanova Z, Mach O. Aldosterone & corticosteroids in a patient suffering from primary aldosteronism & carcinoma of the adrenal cortex. *Sb Lek*1957;59:283-8.4.
4. Jackson WP, Zilberg B, Lewis B, Mc KD. Cushing's syndrome in childhood; report of case of adrenocortical carcinoma with excessive aldosterone production. *Br Med J* 1958;2:130-3. doi: 10.1136/bmj.2.5089.130.

5. Zimmermann B, Moran WH Jr, Rosenberg JC, Kennedy BJ, Frey RJ. Physiologic and surgical problems in the management of primary aldosteronism. *Ann Surg*1959;150:653-65. doi: 10.1097/00000658-195910000-00010.

6. Kuang A, Xu M, Cheng Y, Chen J, Cai G. Primary aldosteronism induced by adrenocortical carcinoma. *Chinese Journal of Internal Medicine* 1963;3:183-9. (Article in Chinese)

7. De Andrade MA, Collet AB, Vieira OM, Luna RL, Andrade SV. Carcinoma of the adrenals with predominant mineralocorticoid effect. *Rev Assoc Med Bras* 1965;11:41-4.

8. Crane MG, Harris JJ, Herber R. Primary aldosteronism due to an adrenal carcinoma. *Ann Intern Med* 1965;63:494-503. doi: 10.7326/0003-4819-63-3-494.

9. Marquezy RA, Bricaire H, Laudat MH, Courjaret J, Philbert M. Adenocarcinoma of the adrenal with hyperandrogenic syndrome and hypermineralocorticism. Urinary elimination of compound S and tetrahydro S, of desoxycorticosterone and of tetrahydrodesoxycorticosterone. *Ann Endocrinol (Paris)* 1965;26:247-66.

10. Knapton PJ. Hypokalemia alkolosis in adrenal carcinoma. *Lancet* 1965;2:346 doi: 10.1016/s0140-6736(65)90327-2.

11. Santander R, González A, Suárez JA. Case of probable mineralocorticoid excess without hypercortisolism due to a carcinoma of the adrenal cortex. *J Clin Endocrinol Metab* 1965;25:1429-35. doi: 10.1210/jcem-25-11-1429.

12. Alterman SL, Dominguez C, Lopez-Gomez A, Lieber AL. Primary adrenocortical carcinoma causing aldosteronism. *Cancer* 1969;24:602-9. doi: 10.1002/1097-0142(196909)24:3<602::aid-cncr2820240327>3.0.co;2-2.

13. Filipecki S, Feltynowski T, Poplawska W, [Lapinska](https://pubmed.ncbi.nlm.nih.gov/?term=Lapinska+K&cauthor_id=5072355) K, Krus S, Wocial B, *et al*. Carcinoma of the adrenal cortex with hyperaldosteronism. *J Clin Endocrinol Metab* 1972;35:225-9. doi: 10.1210/jcem-35-2-225.

14. Miyazaki G, Sasano N, Torikai T, Fukuchi S. Adrenocortical carcinoma with an isolated mineralocorticoid excess and recurrency fourteen years after removal of the tumor. *Tohoku J Exp Med* 1973;109:365-75. doi: 10.1620/tjem.109.365.

15. Salassa TM, Weeks RE, Northcutt RC, Carney JA. Primary aldosteronism and malignant adrenocortical neoplasia. *Trans Am Clin Climatol Assoc* 1975;86:163-72.

16. Grim CE, Ganguly A, Yum MN, Donohue JP, Weinberger MH. Hyperaldosteronism due to unsuspected adrenal carcinoma: discovery during investigation of hypertension in a young woman. *J Urol*1981;126:783-6. doi: 10.1016/s0022-5347(17)54747-3.

17. Taylor HC, Douglas JG, Berg GJ, Bravo EL. Primary aldosteronism caused by adrenal cortical carcinoma. *Endocrinol Jpn* 1982;29:701-8. doi: 10.1507/endocrj1954.29.701.

18. Slee PH, Schaberg A, Van Brummelen P. Carcinoma of the adrenal cortex causing primary hyperaldosteronism. A case report and review of the literature. *Cancer* 1983;51:2341-5. doi: 10.1002/1097-0142(19830615)51:12<2341::aid-cncr2820511229>3.0.co;2-h.

19. Telner AH. Adrenal cortical carcinoma: an unusual cause of hyperaldosteronism. *Can Med Assoc J* 1983;129:731-2.

20. Arteaga E, Biglieri EG, Kater CE, Lopez JM, Schambelan M. Aldosterone-producing adrenocortical carcinoma. Preoperative recognition and course in three cases. *Ann Intern Med* 1984;101:316-21. doi: 10.7326/0003-4819-101-3-316.

21. Chen L, Li T, Chen G, Zhang X. Large adrenocortical carcinoma with the presentation of primary aldosteronism. *Chinese Journal of Internal Medicine* 1984;10:614-5. (Article in Chinese)

22. Greathouse DJ, McDermott MT, Kidd GS, Hofeldt FD. Pure primary hyperaldosteronism due to adrenal cortical carcinoma. *Am J Med* 1984;76:1132-6. doi: 10.1016/0002-9343(84)90870-2.

23. Lüscher T, Tenschert W, Salvetti A, [Pedrinelli](https://pubmed.ncbi.nlm.nih.gov/?term=Pedrinelli+R&cauthor_id=6379276) R, [Maurer](https://pubmed.ncbi.nlm.nih.gov/?term=Maurer+R&cauthor_id=6379276) R, [Turini](https://pubmed.ncbi.nlm.nih.gov/?term=Turini+F&cauthor_id=6379276) F, *et al*. Primary aldosteronism due to adrenal carcinomas. *Klin Wochenschr*1984;62:470-7. doi: 10.1007/BF01726909.

24. Scott HW Jr, Sussman CR, Page DL, Thompson NW, Gross MD, Lloyd R. Primary hyperaldosteronism caused by adrenocortical carcinoma. *World J Surg* 1986;10:646-53. doi: 10.1007/BF01655546.

25. Shenker Y, Gross MD, Grekin RJ, [Rosen](https://pubmed.ncbi.nlm.nih.gov/?term=Rosen+SG&cauthor_id=3711598) SG, [Sanfield](https://pubmed.ncbi.nlm.nih.gov/?term=Sanfield+JA&cauthor_id=3711598) JA, [Shapiro](https://pubmed.ncbi.nlm.nih.gov/?term=Shapiro+B&cauthor_id=3711598) B, *et al*. The scintigraphic localization of mineralocorticoid-producing adrenocortical carcinoma. *J Endocrinol Invest* 1986;9:115-20. doi: 10.1007/BF03348080.

26. Farge D, Chatellier G, Pagny JY, Jeunemaitre X, Plouin PF, Corvol P. Isolated clinical syndrome of primary aldosteronism in four patients with adrenocortical carcinoma. *Am J Med* 1987;83:635-40. doi: 10.1016/0002-9343(87)90891-6.

27. Fraser AG, Croxson MS, Espiner EA, Synek B. Adrenocortical carcinoma presenting as primary aldosteronism in a young man. *Aust N Z J Med* 1987;17:60-2. doi: 10.1111/j.1445-5994.1987.tb05053.x.

28. Isles CG, MacDougall IC, Lever AF, Fraser R. Hypermineralocorticoidism due to adrenal carcinoma: plasma corticosteroids and their response to ACTH and angiotensin II. *Clin Endocrinol (Oxf)* 1987;26:239-51. doi: 10.1111/j.1365-2265.1987.tb00782.x.

29. Tenschert W, Maurer R, Vetter H, Vetter W. Primary aldosteronism by carcinoma of the adrenal cortex. *Klin Wochenschr* 1987;65:428-32. doi: 10.1007/BF01715766.

30. Panesar NS, Tsao SY, Wheeler MJ, Cockram CS. Hyperaldosteronism combined with hypercortisolaemia in a patient with adrenal carcinoma. *Postgrad Med J* 1988;64:278-80. doi: 10.1136/pgmj.64.750.278.

31. Pascual J, Liaño F, García-Villanueva A, Salvador JL, Herrero JA, Ortuño J. Isolated primary aldosteronism in a patient with adrenal carcinoma and XY/XXY mosaic Klinefelter's syndrome. *J Urol* 1990;144:1454-6. doi: 10.1016/s0022-5347(17)39765-3.

32. Touitou Y, Boissonnas A, Bogdan A, Auzéby A. Concurrent adrenocortical carcinoma and Conn's adenoma in a man with primary hyperaldosteronism. In vivo and in vitro studies. *Acta Endocrinol (Copenh)* 1992;127:189-92. doi: 10.1530/acta.0.1270189.

33. Ludvik B, Niederle B, Roka R, Langle F, Neuhold N, Templ M, *et al*. Isolated primary aldosteronism in adrenocortical carcinoma: A case report and review of literature. *Acta Chirurgica Austriaca* 1993;25:212-6.

34. Puvaneswary M, Thong K. Primary hyperaldosteronism: due to adrenal cortical carcinoma. *Australas Radiol* 1993;37:88-9. doi: 10.1111/j.1440-1673.1993.tb00020.x.

35. Weingärtner K, Gerharz EW, Bittinger A, Rosai J, Leppek R, Riedmiller H. Isolated clinical syndrome of primary aldosteronism in a patient with adrenocortical carcinoma. Case report and review of the literature. *Urol Int* 1995;55:232-5. doi: 10.1159/000282795.

36. Feller N, Hoekman K, Kuiper CM, Linn SC, [Verheul](https://pubmed.ncbi.nlm.nih.gov/?term=Verheul+HM&cauthor_id=9815696) HM, [Wolthers](https://pubmed.ncbi.nlm.nih.gov/?term=Wolthers+BG&cauthor_id=9815696) BG, *et al*. A patient with adrenocortical carcinoma: characterization of its biological activity and drug resistance profile. *Clin Cancer Res* 1997;3:389-94.

37. Taylor W, Carroll D, Bethwaite P. Adrenal carcinoma presenting as Conn's syndrome. *Aust N Z J Med* 1997;27:201-2. doi: 10.1111/j.1445-5994.1997.tb00953.x.

38. Sakai N, Yamada T, Asao T, Murayama T. Aldosterone-producing adrenocortical carcinoma metastases found seven years after adrenalectomy. *Int J Urol*1997;4:79-82. doi: 10.1111/j.1442-2042.1997.tb00145.x.

39. Muthusethupathi MA, Vimala A, Jayakumar M, Rajendran S. Normotensive primary aldosteronism due to adrenocortical carcinoma. *Nephron* 1998;79:247-8. doi: 10.1159/000045045.

40. Deckers S, Derdelinckx L, Col V, Hamels J, Maiter D. Peritoneal carcinomatosis following laparoscopic resection of an adrenocortical tumor causing primary hyperaldosteronism. *Horm Res* 1999;52:97-100. doi: 10.1159/000023442.

41. Yoshimoto T, Naruse M, Ito Y, [Naruse](https://pubmed.ncbi.nlm.nih.gov/?term=Naruse+K&cauthor_id=10800765) K, [Ueda](https://pubmed.ncbi.nlm.nih.gov/?term=Ueda+T&cauthor_id=10800765) T, [Tanabe](https://pubmed.ncbi.nlm.nih.gov/?term=Tanabe+A&cauthor_id=10800765) A, *et al*. Adrenocortical carcinoma manifesting pure primary aldosteronism: a case report and analysis of steroidogenic enzymes. *J Endocrinol Invest* 2000;23:112-7. doi: 10.1007/BF03343689.

42. Kang X. Diagnostic experience about malignant adrenocortical adenomas. *Zhejiang Journal of Integrated Traditional Chinese and Western Medicine*2001;11:450-1. (Article in Chinese)

43. Dixon AN, Bing RF. Two cases of adrenocortical carcinoma presenting as Conn's syndrome. *J Hum Hypertens* 2001;15:75-9. doi: 10.1038/sj.jhh.1001105.

44. Mishra A, Agarwal G, Misra AK, Agarwal A, Mishra SK. Functioning adrenal tumours in children and adolescents: an institutional experience. *ANZ J Surg* 2001;71:103-7. doi: 10.1046/j.1440-1622.2001.02045.x.

45. Hisamatsu H, Sakai H, Irie J, Maeda K, Kanetake H. Adrenocortical carcinoma with primary aldosteronism associated with Cushing syndrome during recurrence. *BJU Int* 2002;90:971-2. doi: 10.1046/j.1464-410x.2002.02937.x.

46. Sweeney AT, Blake MA, Aish LS, Pais VM, Dowling JJ, Melby JC, *et al*. A malignant aldosteronoma. *Endocrine Practice* 2002;8:373-7. doi: 10.4158/EP.8.5.373.

47. Zhang D, Liu Y, Lv A. Two cases of huge adrenocortical carcinoma *Journal of Navy Medicine* 2003;24**:**288. (Article in Chinese)

48. Kurtulmus N, Yarman S, Azizlerli H, Kapran Y. Co-secretion of aldosterone and cortisol by an adrenocortical carcinoma. *Horm Res* 2004;62:67-70. doi: 10.1159/000079322.

49. Barzon L, Masi G, Fincati K, Pacenti M, Pezzi V, Altavilla G, *et al*. Shift from Conn's syndrome to Cushing's syndrome in a recurrent adrenocortical carcinoma. *Eur J Endocrinol* 2005;153:629-36. doi: 10.1530/eje.1.02011.

50. Müssig K, Wehrmann M, Horger M, Teichmann R, Maser-Gluth C, Häring HU, *et al*. Steroid profile in an adrenocortical carcinoma producing aldosterone. *Exp Clin Endocrinol Diabetes* 2005;113:236-40. doi: 10.1055/s-2005-837663.

51. Tong A, Zeng Z, Yang D, Li X, Li Z, Wang H, *et al*. Clinicopathological and immunohistochemical analysis of aldosterone-secreting adrenocortical carcinoma: report of one case. *Chin J Endocrinol Metab* 2005;21:398-401. (Article in Chinese)

52. Seccia TM, Fassina A, Nussdorfer GG, Pessina AC, Rossi GP. Aldosterone-producing adrenocortical carcinoma: an unusual cause of Conn's syndrome with an ominous clinical course. *Endocr Relat Cancer* 2005;12:149-59. doi: 10.1677/erc.1.00867.

53. Sun X, Ayala A, Castro CY. Adrenocortical carcinoma with concomitant myelolipoma in a patient with hyperaldosteronism. *Arch Pathol Lab Med* 2005;129:e144-7. doi: 10.5858/2005-129-e144-ACWCMI.

54. Quan H, Fu S. Concurrence of Cushing syndrome and hyperaldosteronism caused by adrenocortical carcinoma: a case report. *Central China Medical Journal* 2006;30 (Article in Chinese)

55. Ali AE, Raphael SJ. Functional oncocytic adrenocortical carcinoma. *Endocr Pathol* 2007;18:187-9. doi: 10.1007/s12022-007-9000-4.

56. Carmona-Bayonas A, Soler IO, Gómez FI, [Billalabeitia](https://pubmed.ncbi.nlm.nih.gov/?term=Billalabeitia+EG&cauthor_id=17675396) EG, [Saura](https://pubmed.ncbi.nlm.nih.gov/?term=Saura+HP&cauthor_id=17675396) HP, [Tafalla](https://pubmed.ncbi.nlm.nih.gov/?term=Tafalla+MS&cauthor_id=17675396) MSA, *et al*. Tailored hormonal therapy in secretory adrenocortical cancer. *Ann Oncol* 2007;18:1281. doi: 10.1093/annonc/mdm273.

57. Fareau GG, Vassilopoulou-Sellin R. Diagnostic challenges in adrenocortical carcinoma: recommendations for surveillance after surgical resection of selected adrenal nodules. *Endocr Pract* 2007;13:636-41. doi: 10.4158/EP.13.6.636.

58. Abma EM, Kluin PM, Dullaart RP. Malignant aldosterone-producing adrenal tumour: reoccurrence with glucocorticoid excess without hyperaldosteronism. *Neth J Med* 2008;66:252-5.

59. Hermsen IG, Gelderblom H, Kievit J, Romijn JA, Haak HR. Extremely long survival in six patients despite recurrent and metastatic adrenal carcinoma. *Eur J Endocrinol* 2008;158:911-9. doi: 10.1530/EJE-07-0723.

60. Hu C. A case report of aldosterone-producing carcinoma. *Journal of Military Surgeon in Southwest China* 2009;11:976-7. (Article in Chinese)

61. Kuo CC, Wu VC, Tsai CW, Wang FF, Chueh SC, Wu KD. A rare cause of secondary hypertension. *NDT Plus* 2009;2:177-8. doi: 10.1093/ndtplus/sfn213.

62. Peppa M, Pikounis V, Papaxoinis G, [Macheras](https://pubmed.ncbi.nlm.nih.gov/?term=Macheras+A&cauthor_id=20181215) A, [Economopoulos](https://pubmed.ncbi.nlm.nih.gov/?term=Economopoulos+T&cauthor_id=20181215) T, [Raptis](https://pubmed.ncbi.nlm.nih.gov/?term=Raptis+SA&cauthor_id=20181215) SA, *et al*. Adrenocortical carcinoma secreting cortisol, androgens and aldosterone: a case report. *Cases J* 2009;2:8951. doi: 10.1186/1757-1626-0002-0000008951.

63. Terui K, Sakihara S, Kageyama K, [Nigawara](https://pubmed.ncbi.nlm.nih.gov/?term=Nigawara+T&cauthor_id=20685888) T, [Takayasu](https://pubmed.ncbi.nlm.nih.gov/?term=Takayasu+S&cauthor_id=20685888) S, [Matsuhashi](https://pubmed.ncbi.nlm.nih.gov/?term=Matsuhashi+Y&cauthor_id=20685888) Y, *et al*. A case of adrenocortical oncocytoma occurring with aldosteronoma. *J Clin Endocrinol Metab* 2010;95:3597-8. doi: 10.1210/jc.2009-2787.

64. Beom SH, Lee KW, Yang Y, [Choi](https://pubmed.ncbi.nlm.nih.gov/?term=Choi+Y&cauthor_id=21980052) Y, Song KH, Kim YJ, *et al*. Metastatic adrenocortical carcinoma presenting simultaneously with Cushing's and Conn's syndromes: a case report. *Jpn J Clin Oncol* 2011;41:1287-91. doi: 10.1093/jjco/hyr144.

65. Hsieh MS, Chen JH, Lin LW. Myxoid adrenal cortical carcinoma presenting as primary hyperaldosteronism: case report and review of the literature. *Int J Surg Pathol* 2011;19:803-7. doi: 10.1177/1066896909356925.

66. Liu Y. Adrenocortical carcinoma with hyperaldosteronism: a case report and literature review. *World Health Digest Medical Periodieal* 2011;8:35-6. (Article in Chinese)

67. Späth M, Korovkin S, Antke C, Anlauf M, Willenberg HS. Aldosterone- and cortisol-co-secreting adrenal tumors: the lost subtype of primary aldosteronism. *Eur J Endocrinol* 2011;164:447-55. doi: 10.1530/EJE-10-1070.

68. Song MS, Seo SW, Bae SB, Kim YJ, Kim SJ. Aldosterone-producing adrenocortical carcinoma without hypertension. *Korean J Intern Med* 2012;27:221-3. doi: 10.3904/kjim.2012.27.2.221.

69. Aghamohammadzadeh N, Faraji A, Bozorgi F, Faraji I, Moghadaszadeh M. Primary hyperaldostronisim as initial presentation of adrenal cortical carcinoma with liver metastasis: A case report. *Int J Hematol Oncol Stem Cell Res* 2013;7:37-41.

70. Xu J, Wu D, Huang J, Gao Y, Shao J. Clinical and pathological analysis of 7 cases of adrenocortical oncocytic carcinoma. *J Clin Exp Pathol* 2013;29:765-9. (Article in Chinese)

71. Agha A, Hornung M, Iesalnieks I, [Schreyer](https://pubmed.ncbi.nlm.nih.gov/?term=Schreyer+A&cauthor_id=24048685) A, [Jung](https://pubmed.ncbi.nlm.nih.gov/?term=Jung+EM&cauthor_id=24048685) EM, [Haneya](https://pubmed.ncbi.nlm.nih.gov/?term=Haneya+A&cauthor_id=24048685) A, *et al*. Predictors of malignancy in primary aldosteronism. *Langenbecks Arch Surg* 2014;399:93-8. doi: 10.1007/s00423-013-1121-2.

72. Chowdhury PS, Nayak P, Gurumurthy S, David D. Aldosterone and cortisol co-secreting bifunctional adrenal cortical carcinoma: A rare event. *Indian J Urol* 2014;30:339-41. doi: 10.4103/0970-1591.134248.

73. Griffin AC, Kelz R, LiVolsi VA. Aldosterone-secreting adrenal cortical carcinoma. A case report and review of the literature. *Endocr Pathol* 2014;25:344-9. doi: 10.1007/s12022-014-9307-x.

74. Hussain S, Panteliou E, Berney DM, [Carpenter](https://pubmed.ncbi.nlm.nih.gov/?term=Carpenter+R&cauthor_id=26273475) R, [Matson](https://pubmed.ncbi.nlm.nih.gov/?term=Matson+M&cauthor_id=26273475) M, [Sahdev](https://pubmed.ncbi.nlm.nih.gov/?term=Sahdev+A&cauthor_id=26273475) A, *et al*. Pure aldosterone-secreting adrenocortical carcinoma in a patient with refractory primary hyperaldosteronism. *Endocrinol Diabetes Metab Case Rep* 2015;2015:150064. doi: 10.1530/EDM-15-0064.

75. Gundara JS, Gill AJ, Glover A, [Benson](https://pubmed.ncbi.nlm.nih.gov/?term=Benson+K&cauthor_id=24165283) K, [Clifton-Bligh](https://pubmed.ncbi.nlm.nih.gov/?term=Clifton-Bligh+R&cauthor_id=24165283) R, [Roxburgh](https://pubmed.ncbi.nlm.nih.gov/?term=Roxburgh+S&cauthor_id=24165283) S, *et al*. Recurrent hyperaldosteronism after adrenalectomy: an indication for careful radiologic and histologic re-evaluation. *ANZ J Surg* 2015;85:289-90. doi: 10.1111/ans.12433.

76. Molina-Ayala M, Ramírez-Rentería C, Manguilar-León A, Paúl-Gaytán P, Ferreira-Hermosillo A. A rare presentation of primary hyperparathyroidism with concurrent aldosterone-producing adrenal carcinoma. *Case Rep Endocrinol* 2015;2015:910984. doi: 10.1155/2015/910984.

77. Nakano R, Satoh D, Nakajima H, Yoshimura Y, Miyoshi H, Yoshida K, *et al*. Repeated resections for liver metastasis from primary adrenocortical carcinoma: A case report. *Int J Surg Case Rep* 2015;9:119-22. doi: 10.1016/j.ijscr.2015.02.041.

78. Daga G, Sharma S, Mittal V. Bilateral Aldosterone-Producing Adrenocortical Carcinoma: a Rare Entity. *Indian J Surg Oncol* 2017;8:88-90. doi: 10.1007/s13193-016-0563-8.

79. Uchida T, Nishimoto K, Fukumura Y, [Asahina](https://pubmed.ncbi.nlm.nih.gov/?term=Asahina+M&cauthor_id=27430645) M, Goto H, [Kawano](https://pubmed.ncbi.nlm.nih.gov/?term=Kawano+Y&cauthor_id=27430645) Y, et al. Disorganized Steroidogenesis in Adrenocortical Carcinoma, a Case Study. *Endocr Pathol* 2017;28:27-35. doi: 10.1007/s12022-016-9441-8.

80. Baradhi KM, Tran T, Mittadodla PS. 'Malignant' hypertension from hyperaldosteronism: a case report. *Pan Afr Med J* 2018;30:10. doi: 10.11604/pamj.2018.30.10.14015.

81. Lazaro K, Adorable-Wagan P. Aldosterone-producing adrenocortical carcinoma with co-secretion of cortisol and estradiol: a case report. *J ASEAN Fed Endocr Soc* 2018;33:57-62. doi: 10.15605/jafes.033.01.10.

82. Yang J, Zeng T, Zhang S, Guo Y, Xu M, Yang C, *et al*. Approach to the patient with aldosterone-producing adrenocortical carcinoma. *Chin J Endocrinol Metab* 2018;34:795-799. (Article in Chinese)

83. Yang Y, Ren H, Wang S, Du X, Ma K, Xu H, *et al*. Primary aldosteronism induced by adrenocortical carcinoma: a case report. *Chin J Urol* 2019;40:941-2. (Article in Chinese)

84. Wang H, Chang X, Ma X, Tong A. Whole-exome sequencing for a rare case of aldosterone-producing adrenocortical carcinoma. *Basic & Clinical Medicine* 2020;40:1190-4. (Article in Chinese)

85. Walz MK, Gwosdz R, Levin SL, [Alesina](https://pubmed.ncbi.nlm.nih.gov/?term=Alesina+PF&cauthor_id=18343972) PF, [Suttorp](https://pubmed.ncbi.nlm.nih.gov/?term=Suttorp+AC&cauthor_id=18343972) AC, [Metz](https://pubmed.ncbi.nlm.nih.gov/?term=Metz+KA&cauthor_id=18343972) KA, et al. Retroperitoneoscopic adrenalectomy in Conn's syndrome caused by adrenal adenomas or nodular hyperplasia. World J Surg 2008;32:847-53. doi: 10.1007/s00268-008-9513-0.

86. Letavernier E, Peyrard S, Amar L, Zinzindohoué F, Fiquet B, Plouin PF. Blood pressure outcome of adrenalectomy in patients with primary hyperaldosteronism with or without unilateral adenoma. *J Hypertens* 2008;26:1816-23. doi: 10.1097/HJH.0b013e3283060f0c.

87. Ishidoya S, Kaiho Y, Ito A, [Morimoto](https://pubmed.ncbi.nlm.nih.gov/?term=Morimoto+R&cauthor_id=21334048) R, [Satoh](https://pubmed.ncbi.nlm.nih.gov/?term=Satoh+F&cauthor_id=21334048) F, Ito S, *et al*. Single-center outcome of laparoscopic unilateral adrenalectomy for patients with primary aldosteronism: lateralizing disease using results of adrenal venous sampling. *Urology* 2011;78:68-73. doi: 10.1016/j.urology.2010.12.042.

88. Wu VC, Kuo CC, Wang SM, Liu KL, Huang KH, Lin YH, *et al*. Primary aldosteronism: changes in cystatin C-based kidney filtration, proteinuria, and renal duplex indices with treatment. *J Hypertens* 2011;29:1778-86. doi: 10.1097/HJH.0b013e3283495cbb.

89. Iwakura Y, Morimoto R, Kudo M, Ono Y, [Takase](https://pubmed.ncbi.nlm.nih.gov/?term=Takase+K&cauthor_id=24285678) K, [Seiji](https://pubmed.ncbi.nlm.nih.gov/?term=Seiji+K&cauthor_id=24285678) K, *et al*. Predictors of decreasing glomerular filtration rate and prevalence of chronic kidney disease after treatment of primary aldosteronism: renal outcome of 213 cases. *J Clin Endocrinol Metab* 2014;99:1593-8. doi: 10.1210/jc.2013-2180.

90. Miyake Y, Tanaka K, Nishikawa T, [Naruse](https://pubmed.ncbi.nlm.nih.gov/?term=Naruse+M&cauthor_id=24077222) M, [Takayanagi](https://pubmed.ncbi.nlm.nih.gov/?term=Takayanagi+R&cauthor_id=24077222) R, [Sasano](https://pubmed.ncbi.nlm.nih.gov/?term=Sasano+H&cauthor_id=24077222) H, *et al*. Prognosis of primary aldosteronism in Japan: results from a nationwide epidemiological study. *Endocr J* 2014;61:35-40. doi: 10.1507/endocrj.ej13-0353.

91. Monticone S, Satoh F, Viola A, Fischer E, Vonend O, Bernini G, *et al*. Aldosterone suppression on contralateral adrenal during adrenal vein sampling does not predict blood pressure response after adrenalectomy. *J Clin Endocrinol Metab* 2014;99:4158-66. doi: 10.1210/jc.2014-2345.

92. Tang L, Li X, Wang B, Ma X, Li H, Gao Y, *et al*. Clinical Characteristics of Aldosterone- and Cortisol-Coproducing Adrenal Adenoma in Primary Aldosteronism. *Int J Endocrinol* 2018;2018:4920841. doi: 10.1155/2018/4920841.

93. Xiao L, Jiang Y, Zhang C, Jiang L, Zhou W, Su T, *et al*. A novel clinical nomogram to predict bilateral hyperaldosteronism in Chinese patients with primary aldosteronism. *Clin Endocrinol (Oxf)* 2019;90:781-8. doi: 10.1111/cen.13962.

94. Shariq OA, Mehta K, Thompson GB, [Lyden](https://pubmed.ncbi.nlm.nih.gov/?term=Lyden+ML&cauthor_id=31214831) ML, [Farley](https://pubmed.ncbi.nlm.nih.gov/?term=Farley+DR&cauthor_id=31214831) DR, [Bancos](https://pubmed.ncbi.nlm.nih.gov/?term=Bancos+I&cauthor_id=31214831) I, *et al*. Primary Aldosteronism: Does Underlying Pathology Impact Clinical Presentation and Outcomes Following Unilateral Adrenalectomy? *World J Surg* 2019;43:2469-76. doi: 10.1007/s00268-019-05059-y.