

Table S1. Joint distributions of the different grades of C6 and C7 for the right and left side and for contralateral sides.

Cervical vertebrae		C6-grades					
C6-right		Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	All
		11	0	0	0	28	39
C7-right	Grade 0	10	0	0	0	1	11
	Grade 1	1	0	0	0	1	2
	Grade 2	0	0	0	0	12	12
	Grade 3	0	0	0	0	14	14
	All	11	0	0	0	28	39
C6-right							
C7-left	Grade 0	2	0	0	0	1	3
	Grade 1	0	0	0	0	1	1
	Grade 2	4	0	0	0	9	13
	Grade 3	5	0	0	0	17	22
	All	11	0	0	0	28	39
C6-left		Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	All
		3	0	1	1	34	39
C7-left	Grade 0	3	0	0	0	0	3
	Grade 1	0	0	0	0	1	1
	Grade 2	0	0	1	1	11	13
	Grade 3	0	0	0	0	22	22
	All	3	0	1	1	34	39
C6-left							
C7-right	Grade 0	2	0	1	1	7	11
	Grade 1	0	0	0	0	2	2
	Grade 2	1	0	0	0	11	12
	Grade 3	0	0	0	0	14	14
	All	3	0	1	1	34	39

Table S2. Joint distributions of normal and malformed C6 and C7 for the right and left side and for contralateral sides. All grades > 0 by side are encoded as 1 and normal vertebrae (grade 0) by side as 0.

Cervical vertebrae		C6		
C6-right		Normal	Malformed	All
		11	28	39
C7-right	Normal	10	1	11
	Malformed	1	27	28
	All	11	28	39
C6-right				
C7-left	Normal	2	1	3
	Malformed	9	27	36
	All	11	28	39
C6-left		Normal	Malformed	All
		3	36	39
C7-left	Normal	3	0	3
	Malformed	0	36	36
	All	3	36	39
C6-left				
C7-right	Normal	2	9	11
	Malformed	1	27	29
	All	3	36	39

Table S3. Joint distributions of the different grades of the length and width of the first ribs for the right and left side and for contralateral sides.

Length of first rib		Length-grades						
R1-right		Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Bifid	All
		12	1	3	15	2	2	35
R1-left	Grade 0	4	0	2	2	0	0	8
	Grade 1	2	0	0	0	0	0	2
	Grade 2	2	1	0	2	0	1	6
	Grade 3	3	0	1	10	0	1	15
	Grade 4	0	0	0	1	2	0	3
	Bifid	1	0	0	0	0	0	1
Width of first rib		Width-grades						
R1-right		Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Bifid	All
		10	4	1	18	2	2	37
R1-left	Grade 0	0	1	4	0	0	0	5
	Grade 1	3	0	0	0	0	0	3
	Grade 2	1	0	1	0	0	0	2
	Grade 3	5	3	0	13	0	2	23
	Grade 4	0	0	0	1	2	0	3
	Bifid	1	0	0	0	0	1	1
Width of first rib		Width-grades						
R1-right		Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Bifid	All
		10	4	0	20	2	2	38
Length of R1-right	Grade 0	10	3	0	0	0	0	13
	Grade 1	1	0	0	0	0	0	1
	Grade 2	0	0	0	3	0	0	3
	Grade 3	0	0	0	17	0	0	17
	Grade 4	0	0	0	0	2	0	2
	Bifid	0	0	0	0	0	2	2
Width of first rib	Width-grades							
R1-right		Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Bifid	All
		9	4	1	18	2	2	36
Length of R1-left	Grade 0	3	1	0	4	0	0	8
	Grade 1	2	0	0	0	0	0	2
	Grade 2	1	2	0	2	0	1	6
	Grade 3	2	1	2	11	0	1	16
	Grade 4	0	0	0	1	2	0	3
	Bifid	1	0	0	0	0	0	1

Width of first rib	Width-grades							
R1-left		Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Bifid	All
		5	3	1	23	3	1	36
Length of R1-right	Grade 0	1	3	1	7	0	1	13
	Grade 1	0	0	0	1	0	0	1
	Grade 2	2	0	0	1	0	0	3
	Grade 3	2	0	0	12	1	0	15
	Grade 4	0	0	0	0	2	0	2
	Bifid	0	0	0	2	0	0	2
Width of first rib	Width-grades							
R1-left		Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Bifid	All
		5	3	2	22	3	1	36
Length of R1-left	Grade 0	5	2	1	0	0	0	8
	Grade 1	0	1	0	1	0	0	2
	Grade 2	0	0	0	6	0	0	6
	Grade 3	0	0	1	15	0	0	16
	Grade 4	0	0	0	0	3	0	3
	Bifid	0	0	0	0	0	1	1

Table S4. Joint distributions of normal and malformed first ribs for the right and left side and for contralateral sides. All grades > 0 by side are encoded as 1 and normal ribs (grade 0) by side as 0.

First ribs		Length		
Length of R1-right		Normal	Malformed	All
		12	23	35
Length of R1-left	Normal	4	4	8
	Malformed	8	19	27
		Width		
Width of R1-right		Normal	Malformed	All
		10	27	37
Width of R1-left	Normal	0	5	5
	Malformed	10	22	32
		Width		
Width of R1-right		Normal	Malformed	All
		10	28	38
Length of R1-right	Normal	10	3	13
	Malformed	0	25	25
		Width		
Width of R1-right		Normal	Malformed	All
		9	27	36
Length of R1-left	Normal	3	5	8
	Malformed	6	22	28
		Width		
Width of R1-left		Normal	Malformed	All
		5	31	36
Length of R1-right	Normal	1	12	13
	Malformed	4	19	23
		Width		
Width of R1-left		Normal	Malformed	All
		5	31	36
Length of R1-left	Normal	5	3	8
	Malformed	0	28	28

Table S5. Joint distributions of the different grades of the width of the second ribs for the right and left side.

Width of second rib	Width-grades							
R2-right		Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Bifid	All
		12	15	2	0	0	2	31
Width of R2-left	Grade 0	4	3	0	0	0	0	7
	Grade 1	7	10	0	0	0	2	19
	Grade 2	0	2	2	0	0	0	4
	Grade 3	0	0	0	0	0	0	0
	Grade 4	0	0	0	0	0	0	0
	Bifid	1	0	0	0	0	0	1

Table S6. Joint distributions of the different grades of the length of the first ribs for the right and left side with the width of the second ribs.

Length of first rib		Length-grades						
R1-right		Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Bifid	All
		10	1	3	16	1	2	33
Width of R2-right	Grade 0	10	0	0	2	0	0	12
	Grade 1	0	1	2	13	1	0	17
	Grade 2	0	0	1	1	0	0	2
	Grade 3	0	0	0	0	0	0	0
	Grade 4	0	0	0	0	0	0	0
	Bifid	0	0	0	0	0	2	2
Length of first rib		Length-grades						
R1-right		Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Bifid	All
		10	1	3	14	0	2	30
Width of R2-left	Grade 0	2	0	2	3	0	0	7
	Grade 1	7	0	0	9	0	2	18
	Grade 2	0	1	1	2	0	0	4
	Grade 3	0	0	0	0	0	0	0
	Grade 4	0	0	0	0	0	0	0
	Bifid	1	0	0	0	0	0	1
Length of first rib		Length-grades						
R1-left		Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Bifid	All
		6	2	6	15	2	1	32
Width of R2-right	Grade 0	3	2	2	4	0	1	12
	Grade 1	3	0	3	8	2	0	16
	Grade 2	0	0	0	2	0	0	2
	Grade 3	0	0	0	0	0	0	0
	Grade 4	0	0	0	0	0	0	0
	Bifid	0	0	1	1	0	0	2
Length of first rib		Length-grades						
R1-left		Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Bifid	All
		6	2	6	15	1	1	31
Width of R2-left	Grade 0	4	1	0	2	0	0	7
	Grade 1	2	1	5	10	1	0	19
	Grade 2	0	0	1	3	0	0	4
	Grade 3	0	0	0	0	0	0	0
	Grade 4	0	0	0	0	0	0	0
	Bifid	0	0	0	0	0	1	1

Table S7. Joint distributions of the different grades of the width of the first ribs for the right and left side with the width of the second ribs.

Width of first rib		Width-grades						
R1-right		Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Bifid	All
		8	3	1	19	1	2	34
Width of R2-right	Grade 0	8	2	0	2	0	0	12
	Grade 1	0	1	1	15	1	0	18
	Grade 2	0	0	0	2	0	0	2
	Grade 3	0	0	0	0	0	0	0
	Grade 4	0	0	0	0	0	0	0
	Bifid	0	0	0	0	0	2	2
Width of first rib		Width-grades						
R1-right		Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Bifid	All
		8	3	1	17	0	2	31
Width of R2-left	Grade 0	2	0	0	5	0	0	7
	Grade 1	5	2	1	9	0	2	19
	Grade 2	0	1	0	3	0	0	4
	Grade 3	0	0	0	0	0	0	0
	Grade 4	0	0	0	0	0	0	0
	Bifid	1	0	0	0	0	0	1
Width of first rib	Width-grades							
R1-left		Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Bifid	All
		3	3	2	21	2	1	32
Width of R2-right	Grade 0	0	3	1	7	0	1	12
	Grade 1	3	0	1	10	2	0	16
	Grade 2	0	0	0	2	0	0	2
	Grade 3	0	0	0	0	0	0	0
	Grade 4	0	0	0	0	0	0	0
	Bifid	0	0	0	2	0	0	2
Width of first rib	Width-grades							
R1-left		Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Bifid	All
		3	3	2	21	1	1	31
Width of R2-left	Grade 0	3	1	0	3	0	0	7
	Grade 1	0	2	2	14	1	0	19
	Grade 2	0	0	0	4	0	0	4

	Grade 3	0	0	0	0	0	0	0
	Grade 4	0	0	0	0	0	0	0
	Bifid	0	0	0	0	0	1	1